

The Mining Journal

LONDON, FEBRUARY 28, 1958

Vol. 250. No. 6393.

Price Ninepence



—for easier, safer development work in metal-mining

Plastic Igniter Cord is a cord-like fuse that burns with an intense flame. It is widely used in development work, stoping, bomb blasting, etc., to ignite series of shots reliably and in the right order.

Close control over firing sequence

Trimming of safety fuses is unnecessary—using standard lengths of fuses, the time interval between shots is accurately controlled by the length of P.I.C. between the shots.

Safer and simpler in use

The shotfirer need waste no time lighting a number of fuses in a smoke-laden atmosphere. He simply lights one end of the P.I.C. or connects it to an electric lighter and retires to safety in the certainty that all his shots will fire in the right order.

P.I.C. is available in two burning speeds—Fast (1 sec./ft. nominal) and Slow (10 sec./ft. nominal).

In development work, all safety fuses are the same length, and are ignited by Slow P.I.C., the firing interval being determined by the length of P.I.C. between shots.

In some conditions, a combination of Fast and Slow P.I.C. will give best results. Shots are arranged in concentric rings. Each ring is connected up with Fast P.I.C. The rings are then connected together with Slow P.I.C. Thus all the shots in the inner ring will detonate before any in the next outer ring, and so on until all shots have fired.

Accessories for use with P.I.C.: Connectors for joining Cord to safety fuse. Electric Lighters for remote control ignition.



For full information write to:

IMPERIAL CHEMICAL INDUSTRIES LTD., LONDON, S.W.1.



CORE RECOVERY

WE SPECIALIZE IN MINERAL
DRILLING WHERE MAXIMUM
CORE RECOVERY IS ESSENTIAL

JOHN THOM
Ltd
CANAL WORKS · ECCLES · MANCHESTER
Telephone: Eccles 2261-2-3
Telegrams: Thom, Patricroft



L9514

"RAPIDITY"
High speed separation
and extraction of one
magnetic mineral

RAPID Magnetic SEPARATORS

For FEEBLY MAGNETIC ORE

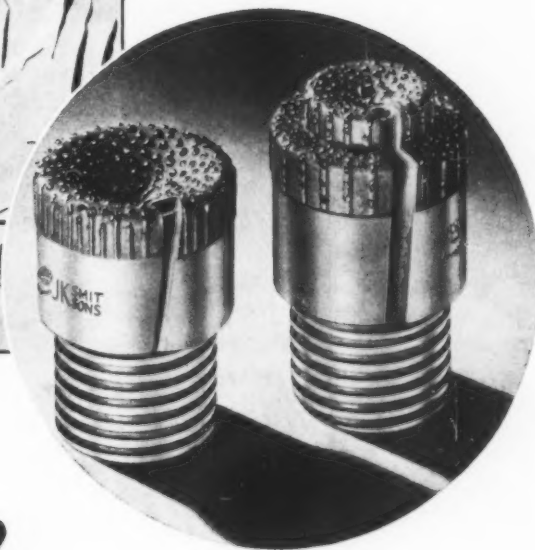
These proved machines successfully treat MONAZITE SANDS, TIN SANDS, IRON SANDS, WOLFRAM, TIN, CORUNDUM, COLUMBITE, etc.

also
Induced Roll and Cross Belt types for suitable applications

THE RECOGNISED AUTHORITY ON MAGNETIC SEPARATION

"RAPID O.G."
Super selective separation
of one, two, or up to six
magnetic minerals, from
the bulk and each other in
one passing. Available in
a range of sizes.

RAPID MAGNETIC MACHINES LIMITED
LOMBARD STREET, BIRMINGHAM, 12 'Phone: VIC. 1137. 'Grams: "Magnetism", B'ham.



Where are diamonds made?

The answer is, in molten lava of a certain chemical composition. That is why the most and finest diamonds have been found in what are called the pipes of old volcanoes. They presumably supplied the fierce heat and pressure to crystallise the carbon into the diamond as we know it—a product of the crucible of Mother Earth.

The J. K. Smit range of diamond Drill Bits will meet all normal requirements. They have been evolved over the last 60 years to meet varying conditions and

formations.

Smit's have been in the forefront of diamond drill bit development. They have led in all the latest applications of the diamond in mine and factory. All this accumulated knowledge is available to customers in the selection of drill bits.

Smit's Technical Advisory Service is always at your disposal, backed by the widest practical experience and the largest and most up-to-date manufacturing facilities. It pays to consult Smit's first.

J. K. SMIT & SONS (DIAMOND TOOLS) LTD.

Mining Division: 22-24, Ely Place, Holborn Circus, London, E.C.1

Telephone: ★ HOLborn 6451

European, American and Canadian Offices:

J. K. Smit & Zonen Diamantgereedschappen (Diamond Tools) N.V., Sarphatistraat 66, Amsterdam (C), Holland

J. K. Smit & Fils, S.A., 28-30, Rue du Docteur Bauer, Saint Ouen (Seine), France

J. K. Smit & Sons, Inc., Murray Hill, New Jersey, U.S.A.

J. K. Smit & Sons of Canada Ltd., 129, Adelaide Street West, Toronto, I



HIS EXPERIENCE... AND OURS

To a modern specially-equipped laboratory comes a steady flow of all classes of ore from the mines of the world.

This ore is tested and examined. Reports and recommendations are made, and as the outcome, some of the finest mining equipment in the world is designed and built.

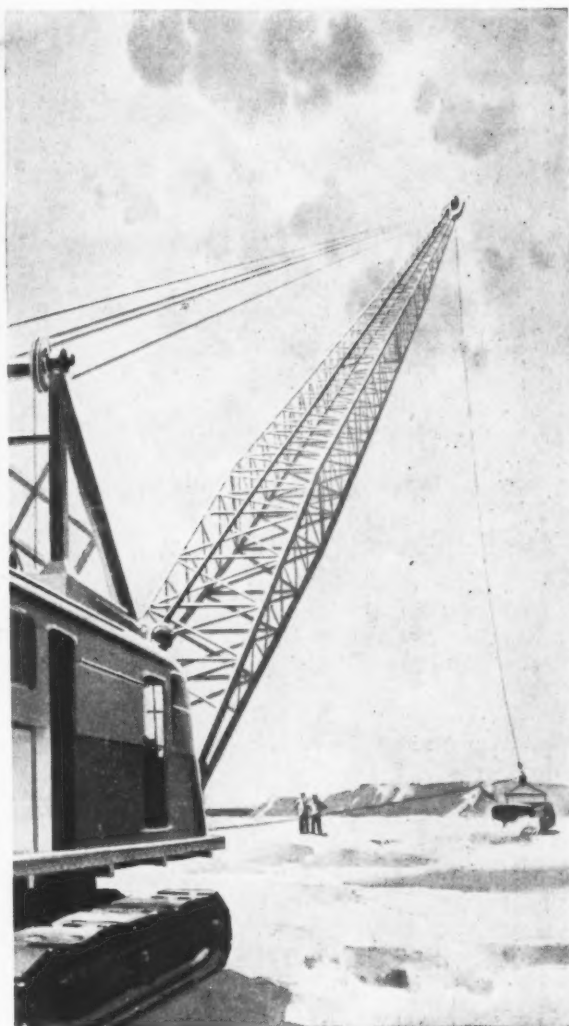
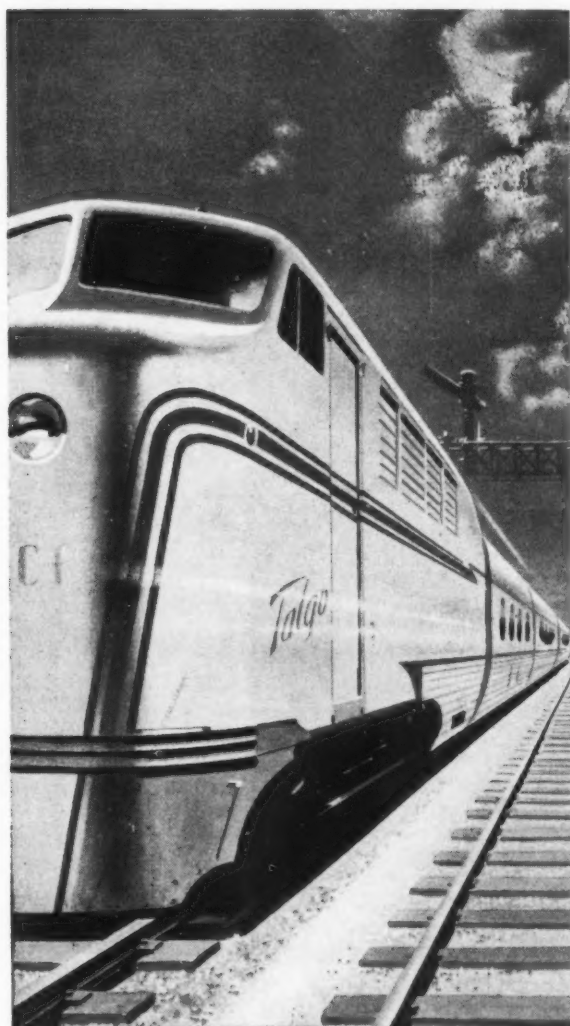
Thus experience is backed by experience. Behind the man at the face are all the resources of an organisation whose name and reputation is known and respected by all who live by mining.

FRASER & CHALMERS

MINERAL DRESSING LABORATORIES

FRASER & CHALMERS ENGINEERING WORKS
ERITH - KENT

ALUMINIUM AT WORK



From the familiar to the less familiar

It is fifty years since aluminium was first used by British engineers in the construction of railway stock. Now it is being used increasingly, all over the world, to give low weight and in turn low running costs. An example where it was used to dramatic effect was in the construction of the Spanish

A.C.F.-Talga train—the coaches are only one-fourth of the weight of conventional steel vehicles! With the lightness of aluminium comes a rugged strength, typified by its use for the jibs of powerful draglines. Aluminium gives these jibs lightness for easy manoeuvrability; it increases their

radius of action and gives them strength to take the strain as the drag makes "mountains into molehills". In all kinds of climates this versatile metal is proving its durability in its thousands of uses. Light, strong, durable—that is aluminium at work. Is it working for you?



Aluminium ingot, produced by Aluminum Company of Canada Ltd., is marketed by Aluminium Union Limited. In addition, the Company exports the products of the various fabricating companies of the Aluminium Limited Group.

Aluminium Union Limited

(Incorporated in Canada)

THE ADELPHI. JOHN ADAM STREET, LONDON, W.C.2.

OFFICES. ASSOCIATED COMPANIES AND AGENTS THROUGHOUT THE WORLD

An ALUMINIUM LIMITED Company





FOR STRIPPING, MINING AND QUARRYING— Modern Excavating Equipment

The 110-RB $4\frac{1}{2}$ cu. yds. heavy-duty mining and quarrying shovel (illustrated) and dragline diesel-electric or full electric with Ward-Leonard control, are outstanding examples of the progressive policy of Ruston-Bucyrus in a specialised field where arduous digging is normal. The 110-RB is designed from tracks to teeth for outstanding strength and maximum efficiency. Each part has been evolved in the light of wide experience, and whilst many of the 110-RB's outstanding features are innovations as far as machines of this class are concerned they have, nevertheless, been fully tried and tested under the severest operational conditions the world over.

**RUSTON-
BUCYRUS**

RUSTON-BUCYRUS LIMITED, EXCAVATOR SPECIALISTS, LINCOLN

THE COMPLETE RANGE OF RUSTON-BUCYRUS EXCAVATORS IS FROM $\frac{1}{2}$ TO 6 CUBIC YARDS CAPACITY

**conveyed
safely**



To convey safely *care* has to be taken; and with conveyor belting the right point at which *care* should be taken is at the design, development and manufacturing stages. After that it should take *care* of itself, the people who work with it and the load it carries. The unique research and manufacturing facilities of Rubber Improvement Ltd. make certain that Leonex P.V.C. Multiply Conveyor Belting is produced with such *great care* that long life, dependability and safety are ensured.

LEONEX "Green for Safety" P.V.C. Conveyor Belting, standard quality (32 oz. duck) and super impact resistant quality (42 oz. duck).

RILON "Green for Safety" flexible and high tensile belting, incorporating high tenacity rayon.

LEONEX
Green for safety

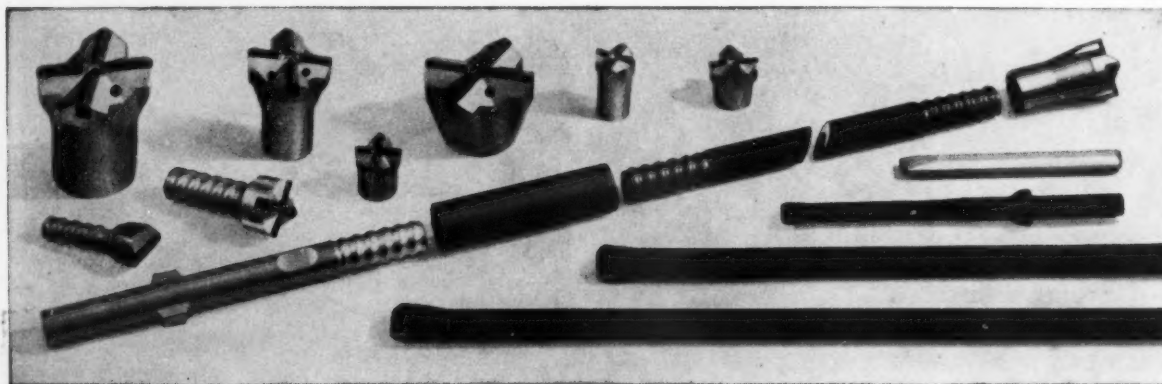
P.V.C. MULTIPLY ANTI-STATIC FIRE-RESISTANT

CONVEYOR BELTING



RUBBER IMPROVEMENT LIMITED

Rilex Works • Wellingborough • Northants • Tel: Wellingborough 2218



SANDVIK COROMANT— A Complete Range of Drill Steel Equipment

You know as well as we do the advantages of buying all your drilling equipment from one supplier. These advantages become still more evident if you buy from the Sandvik Range. The Sandvik Steel Works are the world's largest manufacturers of tungsten carbide for rock drilling. Their production covers integral steels, detachable bits, extension steels and stone working tools—all made of high-quality Swedish alloy steel, all fitted with the well-known Coromant tungsten carbide inserts.

Integral steels with 50% longer life

Sandvik Coromant integral steels have up to 50% longer rod life than ordinary steels, thanks to anti-corrosion SR-treatment, which protects them during transport, storage and actual drilling. In addition, air-tight plastic caps give bit and shank extra protection during transport and storage. They are available in these standard sizes:—

$\frac{3}{4}$ " hollow hexagon	1'4"-13'1"
$\frac{7}{8}$ " hollow hexagon	1'4"-21'0"
1" hollow hexagon	2'6"-21'0"
Flexible drill steels	2'7"-31'6"

Precision-made rock bits

The threads of Sandvik Coromant (cross and X-design) bits are precision milled. The bits are so accurately manufactured that not only smoother drilling but *longer life* are ensured. Standard bit diameter sizes range from $1\frac{1}{2}$ " to $4\frac{1}{2}$ ". The 773 bits (bottoming type) are available with GD400 and GD600 thread, or with $1\frac{1}{4}$ ", $1\frac{1}{2}$ " and 2" rope thread. The 776 bits, for standard shoulder-type drill rods, are available with threads ranging from $\frac{7}{8}$ " to $1\frac{1}{16}$ ".

Efficient extension steels

The rope-threaded joints of Sandvik Coromant extension steels are solid and make joining and unscrewing extremely easy. Sizes available: $\frac{7}{8}$ " and 1" hexagon steels, $1\frac{1}{4}$ " and 2" round steels. A special feature of the $1\frac{1}{4}$ " equipment is the $\frac{1}{2}$ " flushing hole, about twice as large as most. This gives better cleaning of the bore hole and a higher rate of advance, reduces wear and risk of steels sticking. The 'cold rolling' technique makes this wider flushing hole possible *without any loss of strength*.

Wide variety of Stone Working Tools

A single plug hole steel made by Sandvik is capable of drilling up to 1000 holes, each about 3.9". Sandvik Chisel Steels are made with rubber sleeves to reduce vibration and protect the worker. Sizes available: Plug Hole Drill Steels with bit diameters ranging from approx. $\frac{3}{32}$ " to $\frac{7}{8}$ ". Chisel steels with bit diameters from approx. $\frac{5}{16}$ " to $\frac{3}{32}$ ".

The World's foremost drilling unit

Sandvik Coromant extension and drill steels have been developed in close co-operation with Atlas Copco, manufacturers of rock drills and other compressed air equipment. The combination of Sandvik steels and Atlas Copco rock drills is the world's most widely used drilling unit—responsible for the drilling of more than one thousand million feet each year!

The Sandvik Coromant accessories featured here are sold and serviced throughout the world by the Atlas Copco Group of Companies. We have mentioned only the most important products and sizes: for further details, please contact your local Atlas Copco Company or Agent, or write to Atlas Copco AB, Stockholm 1, Sweden.

Atlas Copco Manufacturers of Stationary and Portable Compressors,
Rock-drilling equipment, Loaders, Pneumatic tools and Paint-spraying equipment.

The Mining Journal

London, February 28, 1958

In this issue . . .

Raw Materials for Japanese Industry . . .	235
Russia's Metallurgical Progress . . .	236
China's Industrial Progress . . .	236
Atomic Energy in India . . .	237
Southern Rhodesia's Dwindling Small-workers . . .	237
New Methods of Mining Gilsonite . . .	238
Diamond Drilling With Impregnated Bits . . .	240
Canadian Prospects for 1958 . . .	241
Schooling the Steelworkers . . .	242
Mining in Morocco During 1957 . . .	243
Machinery and Equipment . . .	244
Metals and Minerals . . .	245
London Metal and Ore Prices . . .	246
Mining Finance . . .	247
Company Meeting . . .	249
Mining Miscellany . . .	250

Vol. 250

No. 6393

Established 1835

Joint Editors

U. Baliol Scott R. Bruce Dunfield

News Editor

A. G. Thomson

Assistant Editor

R. Bowran

Display Advertisement Manager

E. S. Hooper

Circulation

Robert Budd

Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott
(Chairman)

U. Baliol Scott
(Managing)

G. A. Baliol Scott

R. A. Ellefsen

**15, WILSON STREET,
LONDON, E.C.2**

Telegraphic

Tutwork London

Telephone

MONarch 2567 (3 lines)

Annual Subscription £3

Single copy ninepence

Raw Materials for Japanese Industry

ATENTION was recently drawn to the dilemma confronting Japan as a result of the current recession (*The Mining Journal*, February 7, 1958, pp. 151 and 152). The Japanese metal industries are very largely dependent on importation for their raw material supplies. In accordance with the general world trend they are at present heavily stocked; in fact, concern is felt at the growth in stocks of chrome ore, which is attributed to the sharp fall in domestic requirements for special steel manufacture. On the other hand, Japanese minerals policy is based on a realistic appreciation of the importance of providing for her long-term requirements of raw materials.

Our correspondent in the Far East writes that the presidents of three Japanese steel mills and Mr. K. B. Lall, joint secretary of the Indian Ministry of Commerce and Industry, have now adopted a long-term plan for the development of Indian iron ore. Japanese mining experts, assisted by the Indian Geological Survey, have conducted extensive investigations into the ore-yielding potentialities of areas in Bihar, Orissa, Madhya Pradesh, Andhra, Mysore, Madras and Bombay States. The Bela Dila area in Madhya Pradesh was considered to be one of India's richest iron ore belts, containing deposits estimated at 700,000,000 tons, and it has the advantage of being readily accessible from the port of Vishakhapatnam.

The Indian-Japanese plan calls for development of an iron ore mining site in the Rourkela district and improvement of railway communication between this area and also of the harbour facilities at Vishakhapatnam. It is anticipated that an additional 2,000,000 tons of iron ore could become available from this new source by about 1962.

The cost of the railway and port development are estimated at \$40,000,000 and that of developing the mining site at about \$10,000,000, and it is hoped that the bulk of the financing can be achieved through a U.S. loan. A Japanese mission is expected to arrive in New Delhi early in March for detailed discussions of the plans, after which it is hoped to submit a joint application to the U.S. by March 31.

Also of interest is an attempt by the Philippines to overcome marketing problems by an approach which, if circumambient, is not uningenious. Briefly, the proposal is that Japan turns Philippine chrome ore into low-carbon ferrochrome, which would be exported to the U.S. for strategic stockpiling, in barter for imports of American surplus foods. Japanese ferrochrome makers are reported to be keenly interested in the offer, provided that the barter deal could be arranged, and hoped to manufacture about 15,000 tons of low-carbon ferrochrome annually from the supply of more than 30,000 tons of chrome ore.

The common denominator between the Philippine proposal and the Indian-Japanese project is that both are dependent on U.S. co-operation, whether in the form of barter or of financial assistance. The present economic climate on the other side of the Pacific is scarcely propitious to either hope, for President Eisenhower's foreign aid proposals are likely to encounter heavy weather in

Congress, while American ferro-chrome manufacturers would doubtless regard the proposed barter arrangement with some disfavour, even at the best of times and however small the quantity involved.

Politically, on the other hand, Uncle Sam can scarcely afford to cold-shoulder the projects of Far-Eastern nations, at any rate without making alternative proposals for assistance. Any failure to extend a helping hand at a time when it was particularly needed might well have unfortunate consequences for the Western nations.

The dangers inherent in the present situation are indicated by Communist China's offer to purchase large quantities of finished steel products in exchange for Japanese purchases of raw materials. This approach has apparently been received with the greatest caution in Japan, but it can scarcely be doubted that, in the event of a prolonged recession, China's proposals would become increasingly attractive to the Japanese metal industries as prices continued to fall and export markets dwindled.

Bearing in mind the grave political consequences of an economic setback in the Far East, it seems probable that, however severely the congressional axe may fall on the foreign aid programme, a high priority would be accorded by the U.S. Administrative to requests for financial assistance emanating from countries in the ECAFE region.

RUSSIA'S METALLURGICAL PROGRESS

Writing in the Soviet publication *Gudok*, V. Keler recalls that 40 years ago no country in Europe was poorer in metal than Russia. In 1913 Russia was last but one in *per capita* production of metal. Its entire output of pig iron, steel and rolled metal at that period was less than the 1956 production of the Magnitogorsk Steel Works alone. In the field of non-ferrous metals the situation was even worse. Despite an abundance of copper, zinc, lead, tin, nickel, aluminium and magnesium resources, the production of these metals was virtually non-existent in Tsarist-Russia.

Keler points out that today the Soviet Union ranks first in Europe and second in the world in metal output. In 1955 it smelted 2.1 times as much steel as Western Germany, 3.6 times as much as France and 2.2 times as much as Britain. Whereas before the revolution two-thirds of the iron and steel plants were to be found in the Ukraine, today the metal industry has spread to practically every part of the country, its progress being particularly rapid in the Urals and Siberia.

Under the Sixth Five-Year Plan many new enterprises will be put into operation in the iron and steel industry, including 26 blast furnaces, 35 open-hearth, 43 electric furnaces, 9 converters and 40 rolling mills. Emphasizing that the metallurgical industry cannot develop successfully unless the mining industry keeps ahead of it, the article claims that approximately half the ore mining is now done by advanced opencast methods, which makes it possible to attain complete mechanization of all the work processes and to raise labour productivity several times.

It is further claimed that in the field of blast furnace production, the U.S.S.R. has long outstripped the U.S. In 1955, states Keler, volumetric blast furnace efficiency in the U.S.S.R. was 0.8 compared with 1.0 in the U.S., and last year the figure was further improved. All blast furnace operations are now fully mechanized.

Great progress is also noted in the non-ferrous metallurgical industry and the article states that the Soviet Union today produces 63 rare or non-ferrous elements. Large deposits of non-ferrous metals have been discovered in nearly every economic area of the country, and plants of

large capacity have been erected on the sites of the primary sources. In 1955 production of refined copper was 153 per cent of the 1950 level, aluminium 289, lead 230, zinc 200, and nickel 137 per cent.

The 20th Congress directives call for a further spectacular increase in output. Under the Sixth Five-Year Plan production of refined copper is to increase by approximately 60 per cent, lead by 42 per cent, zinc by 77 per cent, molybdenum by 100 per cent, tungsten concentrates by 57 per cent, nickel by 64 per cent, marketable magnesium by 110 per cent, and aluminium by 110 per cent.

The article concludes by drawing attention to the extreme importance of developing new types of steel and of ferrous and non-ferrous alloys for the jet aircraft industry, atomic research, rocket production, and other branches of industry which require heat-proof alloys capable of resisting extremely high temperatures.

Keler's claims are indeed impressive, but in the light of Russia's known achievements there is no reason for suspecting that the picture has been overdrawn. Criticisms of shortcomings of Russia's metallurgical industries have not been lacking within the U.S.S.R. itself, such as the alleged failure to provide for the recovery of certain rare metals from the copper ores of the Urals, but such comment can only be regarded as a healthy symptom of an aggressive approach to the problems of minerals development, more especially in a country where criticism, until quite recently, appears to have called for considerable courage.

CHINA'S INDUSTRIAL PROGRESS

The many achievements of China's first Five-Year Plan and the varied objectives of the second were discussed by Li Fu-chun, chairman of the State Planning Commission, at the Congress of the All-China Federation of Trade Unions in December. Li Fu-chun forecast significant increases in production on all industrial fronts except that of the petroleum industry, where the target has had to be reduced. He called for an effort to surpass Britain in industrial production before the start of China's fourth Five-Year Plan.

According to Li Fu-chun, coal production has shown an annual increase of 14 per cent during the first Five-Year Plan. A subsequent statement from the Ministry of the Coal Industry put the 1957 production of state collieries at 94,000,000 tons. News reports state that a new mechanized mine has gone into operation in the Shantan area of Kansu and that one of China's biggest mines, abandoned 11 years ago, has been restored to partial production in Tsinan, Shantung. Reserves in the area are estimated at 100,000,000 tons. The shafts have been designed with Soviet assistance and will provide for coal-cutting by hydraulic pressure, at an annual rate of 600,000 tons.

The figure of 1,500,000 tons was mentioned at the Trade Union Congress as the estimated total petroleum output for 1957. A report from Urumchi states that the capacity of the Tu Shan Tzu refinery in Sinkiang has been doubled to enable it to cope with the increased output of crude oil in the Karami field. A 65-ton oil well drilling machine, designed with Soviet assistance, was tested at the Taiyuan mining machinery plant on December 12. Its boring depth is said to be 1,200 m. Oil prospecting teams have entered the Takla Makan Desert, South Sinkiang, from three sides.

China's gold mining programme for 1958 envisages the revival of mining in Manchuria and the exploitation of a number of little worked deposits elsewhere. In Manchuria output is to be stepped up to 13,000 oz. Three gold refineries are to be built near Mukden and in the frontier province of Heilungkiang seven abandoned gold mines are to be restored to production. Kwangsi province, Southern

China, aims at an output of some 70,000 oz. from 34 expanded mines. A geological survey has confirmed the existence of gold deposits in Southern Yunnan, where values up to 3 grammes per cu. m. of gravel and sand are claimed. A start is to be made with their exploitation during the current year. In Hunan province, Central China, it is planned to expand gold mining operations by 600 per cent. Mining operations on a limited scale have also been started in the Far West.

The chairman of the State Planning Commission stated that it will probably take 20 years to build China into a modern industrial state. He forecasts that by 1972 iron and steel output will be around 40,000,000 tons, equivalent to 6.6 times the 1957 output. China's iron ore reserves are estimated at 12,000,000,000 tons and coal reserves at 1,000,000 million tons. The latter were recently increased by the discovery of coal deposits estimated at over 18,000,000,000 tons in the south-western part of Kweichow province, the seams ranging in thickness from 6 to 10 m.

Priority will be given to heavy industry in order to achieve the following annual totals by 1962: Steel 12,000,000 tons, coal 230,000,000 tons, electricity 44,000,000,000 kW., chemical fertilizers 7,000,000 tons, and cement 12,500,000 tons.

ATOMIC ENERGY IN INDIA

The near possibility of atomic energy providing the necessary power for all industrialization with less burden to the economy of the country, was discussed by Dr. H. J. Bhaba, Chairman of the Atomic Commission of India, who took as his theme for the Sri Krishnarajendra Silver Jubilee Lecture of the University of Mysore the "Economics of Atomic Power in India".

The known reserves of uranium and thorium in India, he said, already exceeded in energy value the equivalent of 30 times the Indian reserves of coal and were enough to support an annual *per capita* consumption equal to that of the industrially more advanced countries for 300 years.

Describing the work that was being done in India to develop atomic energy as a source of electric power and to promote its use in agriculture, biology and medicine, Dr. Bhaba said they had started on the programme by setting up a plant at Akwaye to treat the monazite sands on the west coast. In addition to producing rare earths and trisodium phosphate, a cleaning material sold in the market, this plant produces a cake containing thorium and uranium which is despatched to Trombay, near Bombay, where a very pure thorium salt and also a uranium salt are obtained. A small uranium plant has been designed which will turn the uranium salt into reactor-grade uranium metal and this plant is expected to be in operation by the middle of 1958. It will give India enough uranium metal for experimental purposes and for use in the reactors that are under construction at present.

A small plant for the fabrication of fuel elements has also been designed, and its construction is being undertaken forthwith.

Dr. Bhaba also pointed out that India was one of the largest producers of the rare mineral beryl, from which beryllium can be obtained. Beryllium oxide, he said, might have interesting possibilities as a moderator and the metal, or one of its alloys, held out great promise as a canning material. A large pilot plant for producing atomically-pure beryllium oxide of nuclear purity and sintering it into bricks is being designed. Its capacity will be about 15 tons of beryllium oxide per annum. According to Dr. Bhaba, preliminary studies indicate that the cost of beryllium oxide produced in this plant would be lower than that at which it is being produced in Europe at present.

Zirconium is another metal which has promise as a canning material. Zircon, the mineral from which it can be obtained, is found as a constituent of the famous beach sands of the south-west coast of India and is available in plentiful supply.

The *per capita* consumption of energy in India is about 1/12th that in the United Kingdom and 1/23rd that in the United States. A large part of the energy consumed in India is obtained from burning agricultural waste such as cattle dung. The Indian reserves of conventional fuels and water power are insufficient to support a standard of living comparable with that currently existing in industrially advanced countries.

The *per capita* energy consumption in the United States corresponds to the burning of some nine tons of coal per year. The same *per capita* rate of energy consumption in India would correspond to the burning of 3,600,000,000 tons of coal per year, and this would exhaust the known coal reserves in India in about a decade. The total hydro-electric potential of India was estimated at between 35,000,000 and 40,000,000 kW. and when fully harnessed would hardly amount to 1/10th of a kW. of installed electrical capacity per head of population.

On the other hand, the known Indian reserves in uranium ore containing more than 0.1 per cent exceed 30,000 tons. The known reserves of thorium are about 500,000 tons.

Dr. Bhaba concluded: "It seemed likely that breeder power stations might begin to operate by about 1965. In order that enough plutonium should be available at that time for fuelling such stations, it is clearly necessary to start on an atomic power programme based on natural uranium reactors very soon".

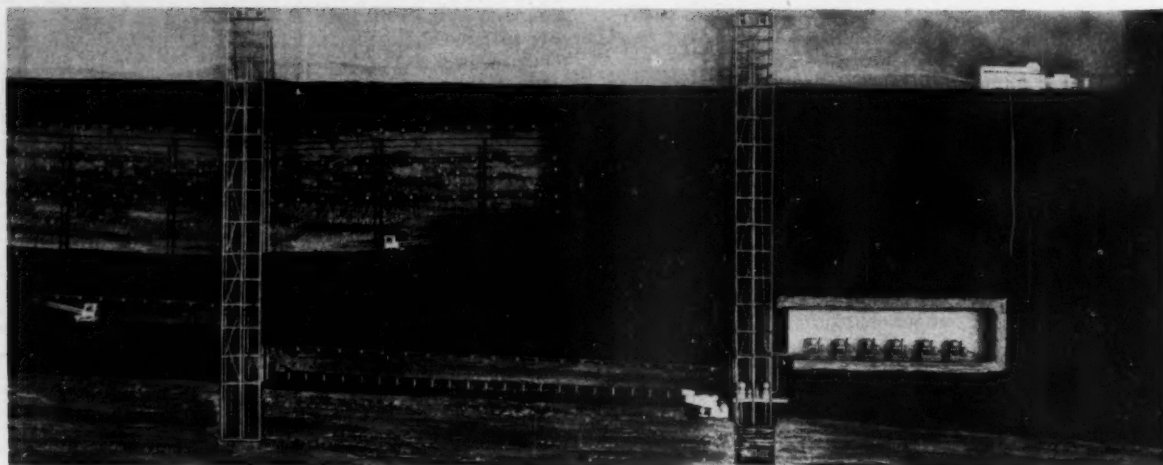
SOUTHERN RHODESIA'S DWINDLING SMALL-WORKERS

A characteristic of mining in Southern Rhodesia has been the number of smallworkers mining gold, or "pig-rooting" and quarrying base metals from the surface according to the variable demands and prices pertaining from time to time for such metals. In his report, recently published, for 1956, the Secretary of Mines points out that two causes are bringing about a profound change in the character of this "surface" mining.

The first is the fixed price of gold, in relation to ever-rising mining costs. There has been no increase in the price of gold since the general devaluation in 1949. This has meant that a number of gold mines, with low grades of ores, which once provided a livelihood for smallworkers, have become unpayable and have been abandoned. The richer gold mines which, because they were rich, passed into company ownership, have continued in production. For these reasons the number of gold producers diminished from 1,753 in 1935 to 301 in 1956. Of these, 204 between them produced only 3.67 of the total gold output in 1956, and 14 of the large mines accounted for 65.65 per cent of the production.

The mining of base minerals in bulk and at depth requires planning, a capital outlay and a sales organization which are beyond the resources of the smallworker. At one time only the base minerals of highest quality were required, but now processes have been found to replace these minerals by less expensive ores of lower grade; accordingly, more ore must be extracted and, to be economic, mining must be undertaken on a large scale.

The position now is that, while 90 per cent of the mines are small ones, 90 per cent of the production is by the large mines.



NEW METHODS OF MINING GILSONITE

RADICALLY different and improved methods of mining gilsonite have been developed for supplying the type of ore required for the new refinery and coke processing plant of American Gilsonite Co., Colorado, and for other gilsonite products. Gilsonite occurs as a solid hydrocarbon in relatively narrow, vertical fissures that run for several miles along surface and may go down as deep as 2,000 ft. Mining this mineral has always presented problems.

The earliest method was to pick at the ore, letting it roll down an incline, where it was loaded into buckets and hauled to the surface. Until a short time ago, most gilsonite was mined by mechanical modifications of this method. Although it will not burn in the solid state, gilsonite dust is highly explosive and this is a constant hazard in the old mining methods.

Two new wet mining methods have been developed by the company over the past four years. Both methods cut the explosion hazard to practically zero and reduce the need for hand labour in the actual mining operations. The first step in the new method is to sink a deep shaft into the gilsonite vein. The vein must be at least 6 ft. wide, and the shaft is initially sunk to over 850 ft. in depth. Subsequently, drifts are dug from either side of the shaft into the gilsonite vein. These drifts are cut by means of a

jet-cutting car, equipped with two different types of cutting heads, depending on the type of ore mined.

Some types of gilsonite ore contain tiny cracks or fractures. In these veins, a powerful jet of water, issuing from a $\frac{1}{4}$ in. nozzle with a pressure of 2,000 lb./sq. in., is played on the surface of the ore. The stream of water penetrates the tiny fissures, the ore breaks apart and falls to the bottom of the drift. The drifts are cut on a rising grade of approximately $2\frac{1}{2}$ deg. The water that cuts the ore, with the help of some low pressure water, washes it down the drift to the main shaft, down the shaft to a sump. The large lumps of ore are crushed to $-\frac{1}{4}$ in. before entering the sump. The water and $-\frac{1}{4}$ in. gilsonite ore are pumped from the sump to the surface with centrifugal pumps.

Another type of ore-cutting tool developed by the company consists of a long rotary drill armed with carbide-tipped teeth. The drill cuts a large swath through the ore and, meanwhile, streams of water pour out through the teeth, keeping the ore constantly wet throughout the entire operation. Again the ore is washed down the drift to the main shaft, is dewatered and hoisted to the surface.

Surface Movement

At the surface, the ore is crushed and introduced into the water again and flows by gravity pipeline to a drying plant at Bonanza. At the drying plant the $+\frac{1}{4}$ in. material is removed by screening. The $-\frac{1}{4}$ in. material is put through a centrifuge. The centrifuge gilsonite and the $+\frac{1}{4}$ in. gilsonite from the screen are mixed and sent to a fluidized bed dryer, where hot air is blown through the gilsonite until it dries to less than 0.5 per cent moisture. This is a continuous process dryer. The product from the dryer is again screened to the various sizes required for the trade. Effluent from the centrifuge is piped to flotation cells where gilsonite and water are separated without the addition of reagents.

Above: A model of a gilsonite vein illustrating operation of the new hydraulic mining methods developed

Opposite: Mechanical cutter developed by American Gilsonite Co. at work in a gilsonite vein

Both types of cutting tools are mounted on a new and unique chassis developed by the company. It is operated by air power. Mounted on it are two hydraulic booms similar to the drilling jumbos used in the mining industry. These jumbos support and guide the cutting tools.

When a drift is completed, the cutting machine returns to the shaft, begins a new drift and repeats the entire operation. Every 50 ft. of depth, a floor will be installed for overhead protection. The walls will be timbered almost solidly with timber. About every 350 ft. of depth, a pillar of ore approximately 30 ft. thick will be left horizontally between the walls for major protection and strengthening. This type of mining rules out the hazard of gilsonite dust. Transportation of the ore in water eliminates the possibility of dust becoming airborne in these large underground caverns.

Ore destined for the refinery is pumped to the surface, dewatered, crushed and then recombined in a tank with a portion of the water which carried it from the bottom of the mine. This slurry is prepared in the proper pumping proportions and then cleansed in a process that eliminates the sand, rock and other tramp materials. Gilsonite is an exceptionally pure mineral and there is simply no foreign matter in the material itself. Sulphur content is very low and there are only traces of other minerals.

After cleaning, the material is stored in 5,000-bbl. tanks. The tanks are agitated to keep the material suspended, and from these tanks the gilsonite slurry is pumped through the pipeline to the refinery 72 miles away.

The Gravity Pipeline

A 72-mile pipeline transports gilsonite ore from mines at Bonanza, Utah, over two suspension bridges, across an 8,500-ft. mountain pass, and into the plant at Gilsonite, Colorado, near Grand Junction, traversing some of the most rugged, uninhabited mountain terrain in the U.S.A.

The line is a 6-in. pipe, buried beneath the frostline, and carries a slurry of crushed gilsonite and water. Concentration of the gilsonite slurry runs about 35 per cent with the water content 65 per cent. Discharge rate of the pipeline is 350 gal./min.



Since precedents for this type of line are rare, many unusual questions arose during its design and construction. There was the problem as to whether solid material would settle out as it went through the line. This would not occur if the velocity were high enough, and the slurry was kept moving through the line at relatively high velocities. Again, if the line be shut down, would all the solid material slide to the low places and plug the line? The grade on the line was, therefore, kept to a flat slope to eliminate the possibility of plugging, and the line is so designed that it will be very difficult to shut it down accidentally.

There are three pumps at the Bonanza pump station. Two pumps are operating, the third being a reserve. All are driven by electric motors. In the event of power failure, the diesel engine-driven pump that supplies the jet mining water will be used to thrust water into the pipeline. In addition, there is a water reservoir at the top of Baxter Pass that will be used to flush the line should the flow stop for some unforeseen reason.

Adequate Water Supply

Adequate water is available at the mines from the White River, and the hydraulic mining methods introduced by the company yield ore in an already-prepared slurry form. All this indicated the practicability of the project and a test programme was instituted to determine the engineering data required for such a pipeline.

Much research went into the design of the pipeline. This test programme took six months and confirmed preliminary evaluations of the project. One of the major factors found in establishing the pipeline design was the particle size of the gilsonite in the feed slurry at the mine end. Although the pumps could handle particles of a $\frac{1}{4}$ -in. size, results were dramatically improved with an 8-mesh size.

This smaller particle size also decreases degradation, or breaking down of the particles as they travel through the pipeline. It also makes dewatering simpler, and makes it easier to maintain a suspension through the line. Hence the gilsonite pipeline is designed to handle 8-mesh particles.

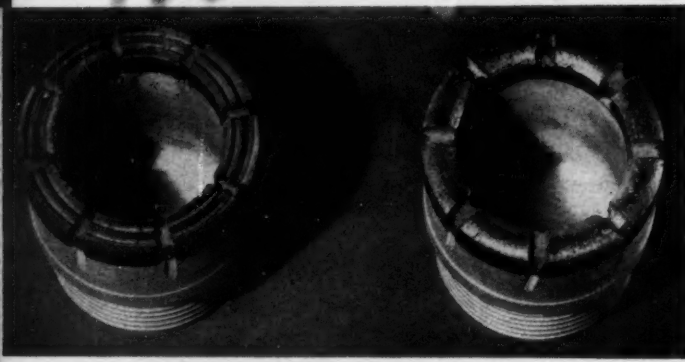
The entire pipeline is laid at a reasonably flat slope, except for two miles past the summit of Baxter Pass, the highest point, where 21-deg. slopes were necessary. Uniform slurry is maintained by two 200,000 gal. tanks at Bonanza which are held under constant agitation.

If power should fail, a diesel-driven pump will be cut into the line and flush the system with water. As mentioned, this pump usually provides high-pressure water for ore cutting in the mines. However, so long as adequate velocities are maintained, slurry can be continuously circulated without build-up of solids.

Flow of Gilsonite

Seven hundred tons per day of gilsonite are flowing into the processing plant. The output is 275 tons per day of calcined coke, 1,300 bbl. per day of petrol and varying amounts of fuel oil, which are being used as fuel in the refinery. The pumping units maintain a pressure of 2,200 lb./sq. in. and a flow rate of 350 gal. per min.; h.p. of each of the three pumps is 300 h.p. The pipeline itself holds some 600,000 gal. of water.

The pipeline was designed by the Engineering Department of Standard Oil Co. of California. The dewatering operation at the Gilsonite, Colorado, terminal was worked out by Standard Oil Co. of California's engineering department with Allen and Garcia of Chicago, and engineers of American Gilsonite Co.



Diamond Drilling with Impregnated Bits

IMPEGNATED bits should be of tremendous value to the diamond drilling industry. However, for divers reasons, they are not being used to any great extent. It is true that further improvements are desirable. These should be in additional types of matrix, and some method should be developed for holding the gauge until the major portion of the diamond content is expended. But the bit in its present state is good, and should be given much more diamond drill work.

During 1949 Boyles Bros. commenced the manufacture of impregnated bits and in 1950 at two widely separated areas, they were tried and found successful. At the Kolar Gold Fields, near Madras, India, where of necessity operations were completed with air pressures of 35 to 50 lb., it was found that impregnated bits would do a better job than whole stone bits in approximately 90 per cent of the rock formation, which consisted of a hard schist. In the Matachewan area of Ontario, in uniformly hard syenite porphyry, excellent results were obtained.

The dominant feature of the initial tests at both properties was the reduction in the rate of penetration, or feed. Previous drilling had been done with bits using 200 per carat whole stones, with penetration speed of 300 r.p.m., or a 300 feed. In this feed, drilling was only accomplished with considerable bit pressure and the bits drilled an average of 25 ft. before they became too dull, or flat, to push further. Using impregnated bits, the initial run of approximately 18 in. was made in the 600 feed and the remainder in the 400 feed.

It was found that impregnated bits cut more freely and a much higher r.p.m. was maintained. This resulted in more footage per shift. At both properties the footage per bit increased from two and one-half to three times, which cut our diamond cost. Also, drilling at reduced pressure saved wear and tear on the equipment with a corresponding reduction in maintenance cost.

The illustration above shows two "Permaset" impregnated diamond bits. "Permaset" is the registered trade name of Boyles Bros. Drilling Co. Ltd., Vancouver, for bits set by the sintered powder metal process. Experience has shown that the bit on the left, with grooves, gives better results in harder rock formations, while that on the right performs more satisfactorily in overburden and softer abrasive rock. The article appearing herewith is by G. R. McWilliams, assistant to the president of Boyles Bros.

Following these initial successes, the impregnated bit was tested widely on other contracts and through sales outlets. The results were disappointing. It appeared at that time that the bit had a limited application. It was concluded that a uniform rock with certain abrasive qualities and crystalline structure was required to wear the matrix and to expose fresh diamond particles at an economical rate before impregnated bits could be successfully employed. Rock crystals must be moderately coarse, as tests in fine-grained rock resulted in smearing the matrix due to heat generated by slow penetration and extreme pressure on the bit. This conclusion appeared to be confirmed by other operators who had purchased these bits for test purposes.

However, during 1954, a contract was undertaken in a hard, fine-grained, banded iron formation of the Sudbury basin. Visually it did not appear suitable for impregnated bits but a trial was made. Again the correct feed was established and the entire contract completed with excellent results.

In British Columbia, where the penetration of overburden in many areas had been painfully slow, impregnated bits and shoes have been of considerable value. Glacial deposits and old stream beds with heavy concentration of boulders and cobbles are extremely difficult to penetrate to depths of 100 ft. and over. The old standpiping method was much too slow and mostly unsuccessful. The drilling down of several telescoping casings was found to complete more holes, but diamond costs were extremely high. By using impregnated casing bits and shoes costs were reduced.

Shortcomings and Potentialities

In their present form, impregnated bits will not successfully complete all jobs of varying types and conditions. However, with the proper education of drill operators and with good supervision, impregnated bits should do considerably more work than at present.

A whole stone bit is at its sharpest, or has its best cutting ability, when first used. It becomes progressively duller, or cuts less readily, until it finally reaches a point where it cannot be forced to cut further. An impregnated bit, on the other hand, should continue to cut just as fast and as freely when the matrix is nearly expended as when the bit was first put in use. It may slow up momentarily as some diamond fragments become worn and flat, but as the matrix wears away, new sharp points start cutting and the bit again advances normally.

A theory that excessive bit pressure causes hole deflection might be proven with the use of impregnated bits, which cut much better at lower pressure. A short test along these lines was made some years ago by one of the larger mining companies. Whether it was coincidental or not, the deflection in holes drilled with impregnated bits was about one-half of the average for holes drilled with whole stone bits.

The successful use of impregnated bits does not always result in lower diamond costs. However, from experience on a considerable variety of jobs, the freer-cutting impregnated bits do produce more footage per shift, and this extra footage more than offsets the increased diamond cost. Reduced maintenance has also cut a few cents from the overall cost picture.

Further trials by the industry should be made to improve the general design of the bit, and in particular, studies should be made to evolve a variety of matrices for use under varying conditions. It is desirable to have the impregnated bits hold their gauge, or new-bit dia., until the matrix is expended. Due to the many formations to be drilled, this is a difficult target, but not an impossible one.

Canadian Prospects for 1958

IN surveying last year's progress and this year's prospects, *The Northern Miner* depicts Canada as pausing to catch her breath after a decade of record-smashing expansion.

Though handicapped by setbacks in almost every phase of business and by drastic declines in metal prices, the Dominion nevertheless managed to set a new record in 1957 for its mineral production. Preliminary government statistics value the total mineral output (excluding oil) at \$1,578,440,970 compared with a total of \$1,566,144,363 in 1956.

If some branches of the mining industry appear to be lagging, considerable encouragement can be drawn from others. In the overall picture, a decline of almost \$100,000,000, caused by lower copper prices, is offset by an almost equal gain resulting from the increase in uranium production. The decrease of \$30,000,000 in lead and zinc production is obscured by a rise of almost \$40,000,000 in the value of Canadian nickel production. With the

exception of copper, lead and zinc, Canada produced more mineral wealth than ever before.

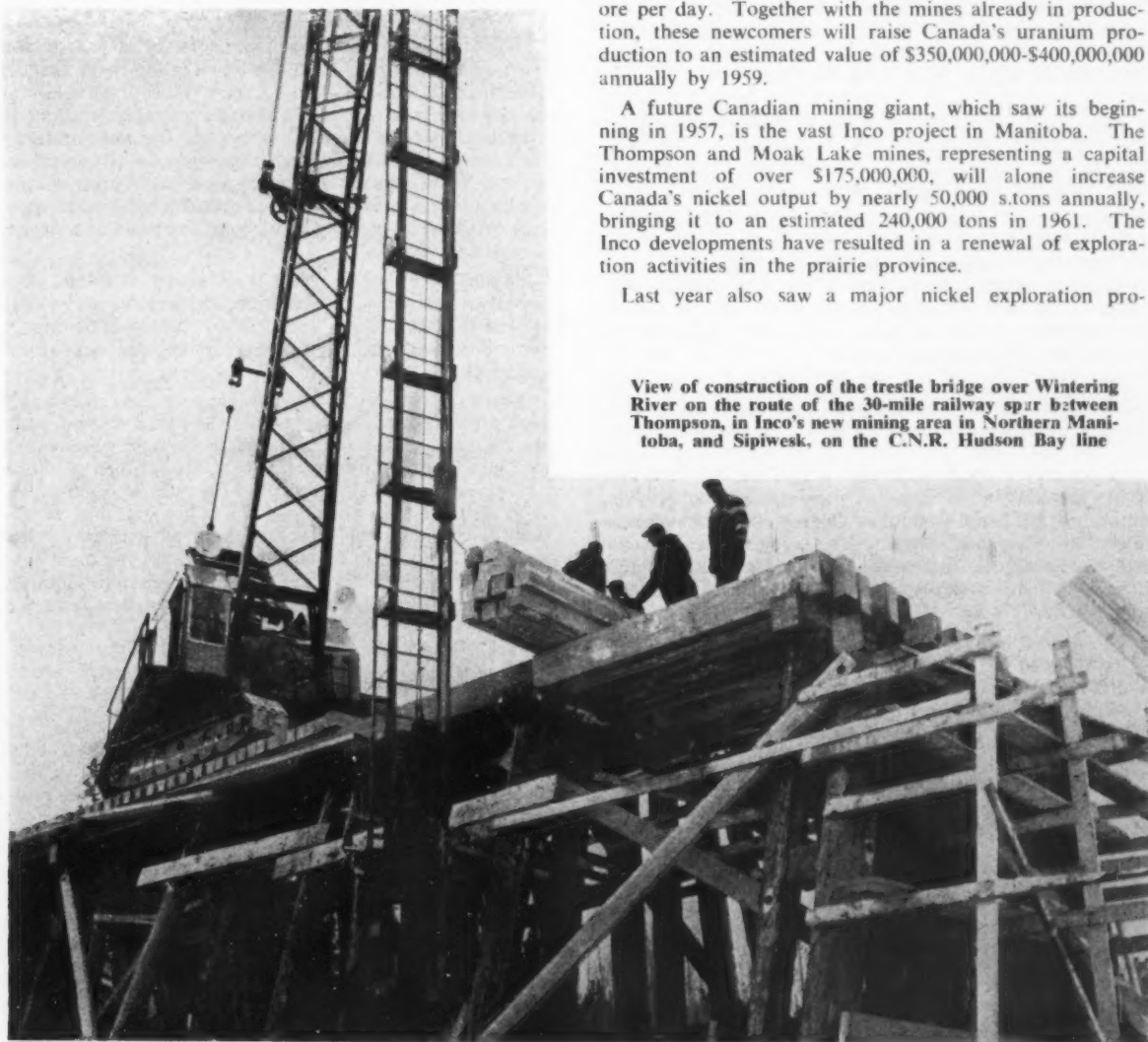
Of the world scene, Canada continues to rate as the largest producer of nickel, asbestos, calcium metal and nepheline syenite; as the second largest producer of aluminium, gold, cobalt, cadmium, magnesium, platinum, selenium and zinc. Canada is still in the third place as a uranium producer, but the U.S. and South Africa are being overhauled. Other thirds include molybdenum, silver, titanium and barytes. Canada is the fourth largest producer of copper, lead, fluorspar and bismuth.

Last year Canada witnessed a spectacular expansion of its uranium industry with the entry into production of eight mines with a total mill capacity of 21,150 tons of ore per day. In addition, four mines started shipping ore for custom treatment. Although officially in production, many of these mines will not reach their full capacity for several months. Other uranium mines scheduled to reach production in 1958 are Stanrock, Stanleigh, Northspan's American and Panel mines, Milliken Lake and Canadian Dyno. Their combined mill capacity is 15,100 tons of ore per day. Together with the mines already in production, these newcomers will raise Canada's uranium production to an estimated value of \$350,000,000-\$400,000,000 annually by 1959.

A future Canadian mining giant, which saw its beginning in 1957, is the vast Inco project in Manitoba. The Thompson and Moak Lake mines, representing a capital investment of over \$175,000,000, will alone increase Canada's nickel output by nearly 50,000 tons annually, bringing it to an estimated 240,000 tons in 1961. The Inco developments have resulted in a renewal of exploration activities in the prairie province.

Last year also saw a major nickel exploration pro-

View of construction of the trestle bridge over Wintering River on the route of the 30-mile railway spur between Thompson, in Inco's new mining area in Northern Manitoba, and Sipiwek, on the C.N.R. Hudson Bay line



gramme launched by a number of companies in Ungava, Quebec. Sufficient encouragement has been obtained and enough preliminary work has been completed to enable the companies to resume full-scale exploration this year. Nickel exploration in the sub-Arctic was further encouraged by the start of production at North Rankin Nickel Mines in the North-West Territories.

Although low base-metal prices tended to dull the ardour of prospectors, 1957 was not without important developments in the base-metal field. The most important find of the year was made in north-western Quebec by the Mattagami Syndicate, interest in which is shared by six mining companies. The find has been estimated at some 10,000,000 tons averaging 10-12 per cent zinc, 0.75 per cent copper, about 75 c. in gold and possibly £2 per ton in silver. Another important event was the start of production at Heath Steele Mines in New Brunswick and the completion of a 23-mile rail link to the mine.

Interesting Prospects

Tight money and the prospect of lower earnings resulting from slashed base-metal prices prevented a number of prospective mines from obtaining the necessary funds for additional development programmes and for bringing several deposits into production. An improvement in metal prices and a relaxation of tight money conditions could revive a number of interesting mining prospects and place them on the way to production this year.

Important decisions are also awaited this year on the future of several iron ore properties. The Quebec Cartier and Wabush developments alone, if launched, would represent an investment of close to \$500,000 over several years. The Cartier company has recently received approval from the Quebec Government for the construction of a 200-mile railway into the Mt. Reed - Mt. Wright area. When this \$300,000,000 development is launched, the Mt. Wright area is likely to become one of Canada's leading iron ore producers. The cost of bringing the Wabush Lake project into production is now estimated at some \$175,000,000 and a decision is expected this year.

In order to maintain Canadian leadership in asbestos production, this industry is taking a long-range view in proceeding with its vast expansion plans. A programme costing over \$64,000,000 will result in the addition of 11,500 tons per day capacity with the completion of three new mines this year in the Eastern Townships of Quebec. The new mines are Lake Asbestos of Quebec, National Asbestos and Carey-Canadian Mines. This programme, together with modernization and expansion of older producers, will increase Canada's asbestos producing capacity to 59,700 tons per day.

Throughout last year the gold mining industry continued to be plagued by the twin evils of the low price of gold and the high exchange rate on the Canadian dollar. Nevertheless, Cochenour Willans opened up an entire new mine at depth and sparked a renewed public interest in golds.

Saskatchewan is eagerly looking forward to the beginning of production from its vast potash deposits, scheduled for this year.

All told, 1957 was not a bad year for Canada and Canadian mining. Despite metal price cuts, Canadian mines paid approximately \$150,000,000 in dividends, a figure exceeded only in the record years of 1955 and 1956.

Although opinions differ on what the current year will bring, most observers agree that Canadian mining can expect 1958 to be as good a year as 1957, while optimists feel that it could be much better.

Schooling the Steel Workers

THE cutback in American steel production, which began in the later months of last year and has since assumed calamitous proportions, has been accepted with remarkable equanimity. A recent return disclosed that steel-making furnaces were operating at no more than 56.1 per cent of capacity and as yet there is no indication of a turn of the tide.

Apparently the leaders of the U.S. industry are unperturbed. They are counting upon a progressive acceleration of the industry's operating rate as the year advances, and a price rise of at least \$7 per ton at the end of the half-year to offset a further wage advance. Of course, it is possible that events may falsify these calculations; recovery may be longer delayed; but acknowledging the possibility of a prolongation of a period in which capacity far exceeds current demand, U.S. steel pins its faith to a policy of expansion which has been vindicated by past experience.

In the past ten years American steel companies have increased their ingot capacity by 46,500,000 tons. In 1957 the increase amounted to 7,300,000 tons and further huge investments in new plant and new processes already approved promise continuous growth in the next decade.

The ambitions of the positive enterprise of British steel companies does not suffer by comparison with that of American or European producers. Neither the threat of re-nationalization, against which the industry is about to launch a vigorous defensive campaign, nor the immediate difficulties to raising the huge aggregations of capital required, have imposed any perceptible curb upon the industry's third development plan, designed to increase capacity by about 30 per cent in the next five years at a capital cost of £600,000,000.

Expansion at such a rate poses many problems in a country whose physical and financial resources are already subject to severe strains and stresses. Not least of these is the recruitment and the training of the men needed for the successful operation of the new plant.

The steel industry offers rich rewards. A remarkably high percentage of the top men in the board rooms and in the chief executive posts began on the bottom rungs of the ladder. There is always room at the top for men of ability and expert knowledge. But below the rank of commander-in-chief, there is in every steel works a wide range of responsible positions which are open to all aspirants. The problem, in short, is to find the right men for these jobs and it is one which has been made infinitely more difficult by the competing claims of other industries in a restricted labour market.

Technical Education

Education and training are essential qualifications. In an industry where capital equipment averages about £10,000 for every worker employed it is imperative that the operatives and the foremen should understand the principles of the processes which come under their control.

With this end in view, the British Iron and Steel Federation has developed a comprehensive system of technical education, which is supplemented by training centres at most of the principal steel works throughout the country. Education, in fact, starts before a boy's name is first entered on the payroll. Schools are provided with material suitable for instruction in the basic metallurgy of iron and steel manufacture. Film strips and wall charts are available for educational institutions and member firms.

At a higher level Mr. D. J. O. Brandt has prepared a text-book specially written for the Federation to cover the syllabus of the Iron and Steel Operatives' Course of the City and Guilds of the London Institute. Area Training Committees co-operate with local education authorities in the instruction of apprentices who are given every opportunity, including day-time release from work, to attend these classes.

For foremen, residential courses are provided, and it is of interest to observe that during the last six years these have been attended by 2,356 foremen from 150 different companies. In addition, 80 young executives are now sent abroad every year for visits of a month's duration to Euro-

pean iron and steel plants. This interchange of visits is on a mutual basis. Foreign visitors are welcomed in this country and there are at present large numbers of Indian trainees who are acquiring first-hand knowledge of British steel-making to qualify for the higher posts in the new steel plant now being built at Dungarpur.

To this ever-widening system of technical education and instruction the latest addition has been provided by Richard Thomas and Baldwins Ltd., who have acquired one of the stately homes of England, the beautiful Manor House at Stoke D'Abernan in Surrey, and have established therein the first staff college for the training of management personnel.

Mining in Morocco During 1957

MOROCCO had an excellent mining year in 1957 when production records were broken for phosphates, iron ore, manganese, zinc ore and anthracite, whilst the value of exports reached the unprecedented total of just over Frs.61,000,000,000, or more than half the value of all Morocco's exports put together in 1956.

Our correspondent in the country reports that whilst practically all other sectors of economic activity suffered a general recession, the Moroccan mining industry continued to prosper, although costs rose during the year and there were several labour disputes in the major enterprises, notably the Imini manganese mines and the Aouli-Mibladen lead-zinc workings.

Phosphates forged ahead with a total output of 5,567,519 tons compared to 5,521,817 tons in 1956, while total exports amounted to 5,356,574 tons, both figures being records. The major markets were:

Country	Tons	Country	Tons
France ...	787,293	South Africa ...	371,105
Italy ...	723,285	Netherlands ...	313,133
Gt. Britain ...	657,038	Sweden ...	238,734
W. Germany ...	549,325	Denmark ...	193,780
Spain ...	404,738	Portugal ...	189,284
Belgium ...	391,903		

Due to a slight drop in freight charges, somewhat keener competition was felt on some markets from American phosphate.

Iron ore production and exports were better by about 30 per cent than in 1956, total output attaining the record total of 1,868,122 tons, of which 1,400,200 tons came from the Spanish mines in the north and the remainder principally from the Ait Amar. Britain, W. Germany, the Netherlands, Spain and France continued to be the major markets.

The Jerada anthracite mines produced 520,999 tons, nearly 40,000 tons more than in the previous year, and exports were also better (251,376 tons) to France, North Africa, Belgium, Italy and the Netherlands. The Moroccan market absorbed 204,880 tons plus 4,275 tons of agglomerates, another 5,128 tons of the latter going to neighbouring Algeria. Anthracite fines are still hard to dispose of and efforts are to be made to increase the manu-

facture of agglomerates for consumption in Morocco and the rest of North Africa.

It has long been thought that the discovery of further workable coal deposits was improbable, but, nevertheless, prospecting is to be intensified during the coming year on the plateaux overlooking Jerada, near Aoufouz, in the Tafilalet oasis and in the Hammada du Ghir, near Abadla, in the Algerian-Moroccan border area.

Another production record was registered in the manganese mining industry. A total of 414,435 tons of metallurgical grade ore was mined and 77,053 tons of chemical, the latter being almost double the 1956 figure. Exports were 344,759 tons of metallurgical and 53,529 tons of chemical. Demand for the finer grade being so high, several small workings are being exploited again in the Ouarzazate area after being uneconomic for several years.

Lead and zinc ores continued to progress, especially the latter, which rose from 70,921 tons in 1956 to 88,873 tons last year. Lead ores totalled 127,108 tons compared to 120,047 tons the previous year, to which must be added the 1,356 tons mined in the former Spanish zone last year. Prospects for lead ore seem promising as Penarroya's Jebel Aouam mine in the Middle Atlas was brought into production last year with an average of 530 tons of ore a month, and this figure is expected to be boosted to between 1,000 and 1,500 tons a month, making this mine as productive as the same company's mines at Aouli. The Jebel Aouam ore has a 10.5 per cent metal content.

The Oued el Heimer smelter continued to improve output in the year under review, enabling the export of 29,708 tons of pig lead and the sale on the Moroccan market of 287 tons of piping and 17 tons of metal. Silver extraction produced 26,714 kg. for export to France. Lead metal exports went to France (19,403 tons), the United States (8,242 tons) and Algeria (2,063 tons).

Cobalt ore from the Bou Azzer du Grara deposits fell back from 6,438 tons to 4,230 tons last year, despite improvements to installations and water supplies at the mine. Copper ore receded to 2,138 tons from 2,863 tons in 1956.

Morocco's petroleum output fell sharply to 75,096 tons from 97,452 tons of crude oil in 1956.

1957 MINERAL PRODUCTION IN MOROCCO (in tonnes)

SOUTHERN ZONE			SOUTHERN ZONE			SOUTHERN ZONE		
	Output	Exports		Output	Exports		Output	Exports
Anthracite ...	520,999	251,376	Iron pyrites ...	6,260	—	Petroleum ...	75,096	—
Phosphates ...	5,567,519	5,356,574	Cobalt ore ...	4,230	4,892			
Lead ore ...	127,108	101,631	Copper ore ...	2,138	2,118	NORTHERN ZONE		
Zinc ore ...	88,873	88,948	Asbestos ...	120	50	Metallurgical Manganese ...		664
Metall. Manganese	414,435	344,759	Tin ore ...	12	—	Iron ore ...		1,400,200
Chem. Manganese	77,053	53,329	Salt ...	51,965	—	Lead ore ...		1,356
Iron ore ...	467,922	498,680	Barytine ...	14,765	17,099	Bentonite ...		4,976
Iron oxide ...	1,565	1,459	Strontium ...	270	100	Antimony ore ...		816

Machinery and Equipment

The "Lion" and the Loader

The Ribber Mine at Matlock, Derby, was the venue last week for members of the technical Press to witness a demonstration of a range of mining equipment produced by Atlas Copco which will be introduced to the British market in March.

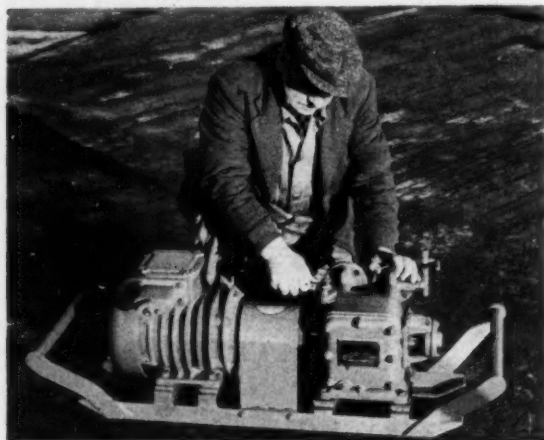
Of particular interest was the rock drill (BBC 22 WK) named the "Lion", together with a new pusher leg and a new mine loader—the LM 56.

The "Lion", which is designed for working in large tunnels or in mines where holes from 10 ft. to 90 ft. are to be drilled, weighs 66 lb. and is claimed to be one of the fastest machines of its weight marketed and having a capacity 30 per cent greater than other rock drills of the same weight.

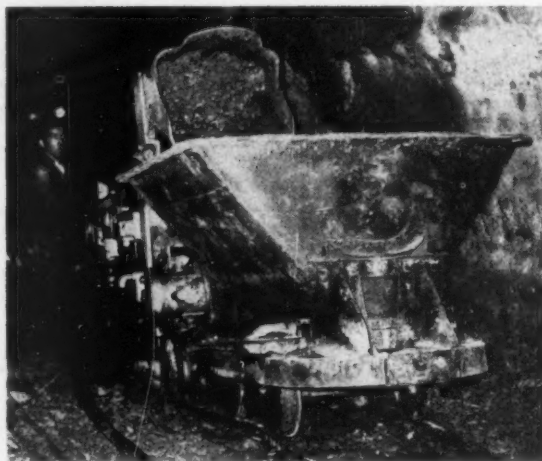
The feature of this machine is that all controls are on the back head and on the handle. Centralization of the controls enables feeding, flushing and operation of the drill to be effected with the same throttle lever. A second lever on the back head is used to adjust the feed pressure to the pusher. Accordingly, no air hose for the pusher is necessary. On the handle is a control valve which, when depressed, contracts the pusher leg. This can be achieved without interrupting drilling, thereby saving time and, consequently, increasing gross drilling speed.

The "Lion" can also be accommodated to chain- and screw-feed equipment or modified to a sinker. When employed as a sinker, it should be used with a counter-weight to minimize recoil.

The LM 56 mine loader, shown in operation at the Ribber Mine, incorporates several new components, including special silencers which should appeal to all operators and design features enabling it to carry out dip-loading. For this latter application, Atlas Copco have mounted a winch on the back of the loader and have arranged the air supply to the winch and traction motor of the loader so that it is interlocked through the traction motor control. This results in the raising and lowering of the loader being at all times positive and independent of the adhesion between the wheels and the track.

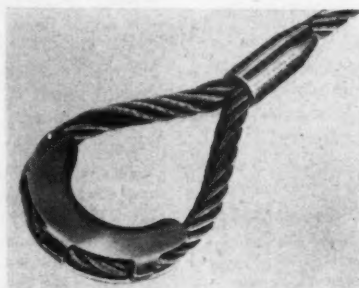


Right: An Atlas Copco loader type LM 56 in a 1 in 4 dip at the Ribber Mine, Matlock



A SAFE MECHANICAL SPLICE

Last week a representative of *The Mining Journal* saw the new Superloop Stirrup manufactured by British Ropes Ltd. This fitting is made of white heart malleable iron in a wide range of sizes. It is fitted after the superloop is formed, but before the proof loading operation.



The superloop fitted with a stirrup allows the eye bearing to be protected from wear, thus providing improved sling life. It can be reeved without the additional weight and cost of a reeving thimble, and replacement on the spot is easily accomplished.

The superloop embodies a steel sleeve closed over the tails of a Flemish eye splice, the present range covering rope diameters from $\frac{7}{8}$ in. to $1\frac{1}{2}$ in. The

manufacturers state that the superloop is made in conjunction with Blue Strand pre-formed rope to provide the perfect sling.

The new combination has obvious applications in mining and quarrying. Tests completed last week at Charlton comprised breaking tests (to destruction) ranging from 11.5 tons breaking load for Flemish eye sling to 23.5 tons for rope tensile test. In different tests, superloop slings broke at 22.6, 21.3, 15.1 and 14.6 tons. All these breakage points are well in excess of those required by British Standards.

ALUMINIUM DUMP TRUCK

Alcoa Exploration Co., a subsidiary of the Aluminum Co. of America, which operates in the Dominican Republic, has ordered what is believed to be the largest aluminium dump truck in the world from Mack Co. It has a capacity of 37½ cu. yds. and weighs 27 tons. A special feature of the truck is the heated floor. Engine gases pass into the hollow body, which when hot facilitates the dumping of moist bauxite.

Alcoa is to spend \$10,000,000 on developing the large bauxite deposits in the Republic, estimated at 60,000,000 tons, with an aluminium content of 45 to 50 per cent. The Dominican Government is to co-operate with the company in converting the harbour of Enriquillo into a deep-water port for shipping the ore. Plans are under way for the construction of a government-financed aluminium reduction plant, which when in operation will buy 850,000 tons of ore annually from Alcoa.

THE PUDDLE PUMP

A new, compact, portable, face-drainage unit, specially designed to deal with small amounts of "nuisance water" at the coal-face, has been introduced by Megator Pumps and Compressors Ltd.

Known as the Megator Puddle Pump, the unit consists of a small version of the standard Megator M50 face-drainage pump powered by a continuously rated, flameproof, mining-type motor wound for 110 volts, three phase, 50 cycles. The pump will handle 8 g.p.m. with a total head from all causes of 100 ft. The complete set is mounted on a mining-type base fitted with lifting handles.

Centre: The Superloop Stirrup

Below: The new Megator Puddle pump

Metals and Minerals

Plentiful Cobalt Supply Assured

Many consumers and potential users of cobalt, some of whom still fear a future scarcity of supplies, are unaware of the outstandingly rapid rise in Free World output, according to cobalt experts attending the American Institute of Mechanical Engineers convention in New York last week.

M. V. Vinckenroy, director of the Cobalt Information Centre of Brussels, told the convention that Free World production advanced last year to some 16,030 tonnes, which was 1,000 tonnes higher than in 1956. This compares with 4,000 tonnes in 1940. Free World use of the metal is only in the region of 8,000 tonnes, of which roughly 5,000 tonnes is consumed in the United States.

The increase in production has been practically a steady climb and has overcome former scarcities. A plentiful cobalt supply seems reasonably assured for the future, because of new production and the sizeable potential of numerous untapped deposits of cobalt minerals. Temporary shortages during the Korean War, however, may have caused engineers to design away from cobalt. A recent survey by Dr. F. R. Morral, head of the American branch office of the Cobalt Information Centre, which is located at the Battelle Memorial Institute in Columbus, indicates that design engineers lack considerable data about cobalt materials for use at temperatures above 1,600 deg. F.

Mr. Vinckenroy stated that research work on cobalt had been stepped up by 50 per cent from 1957 to 1958, and that even more research may be scheduled in the future. About thirteen companies in North America, Europe and Africa are members of the Cobalt Information Centre.

There are signs of large strategic requirements for cobalt. It is anticipated that the metal will probably find expanding civilian use in permanent magnets, a field which holds great promise because of rapid advances in electrical instrumentation. Cobalt may be especially needed for magnets operating at high temperature. Other spheres in which greater usage seems probable include high-temperature coatings and certain specialized fields such as a Co-Mo alloy, which functions as a catalyst in desulphurization of crude oil. The latter outlet will not absorb a large tonnage, but it represents one of the new uses. Commercial and military British aircraft are using cobalt in turbine parts. Medical work will take only a small amount of the metal in an irradiated form.

Russian cobalt output is estimated to be in the vicinity of only 750 tonnes per year, and it is believed that the Soviet has ambitions to purchase Free World metal. Soviet space devices and/or missile nose cones are reported to use cobalt in alloys, cermets, and ceramics. During the Korean War, Soviet aircraft used cobalt in certain engine parts. Russia appears to be inadequately supplied with the metal, of which more is probably needed for high-temperature alloys and related applications.

TURKISH CHROME ORGANIZATION

Turkey's Maden Kredi Bankasi (Mineral Credit Bank) has begun operations. The initial capital of this organization, which received government approval last year, amounts to £T28,000,000, three-quarters of which has been subscribed by private undertakings and the remainder by the Eti-Bank, which represents State-controlled mines and handles their exports. The Bank immediately called into being a chrome production company under the name of Krom-Ischletmesi AO, whose terms of reference are to represent, within the Bank, the interests of chrome mine owners.

Credits to be allocated by the Bank will be given mainly to improve export possibilities for Turkish chrome by reducing mine exploration costs. This is to be brought about by modernizing the installations and especially by improving transport facilities. At present, large amounts of ore stockpiled at the mines cannot be moved to the ports because of the lack of transport and poor communications.

The new body does not supersede the Chrome Committee, which for many years has represented the interests of private chrome producers in dealing with State organizations and the government.

QUICKSILVER PRICES RISE

The London ex-warehouse quicksilver price continues to edge higher and is now £76-£77 per flask. Supplies of physical metal on the spot are short and a further upward revision cannot be ruled out. Rather more buying interest is currently being displayed. In the United States the price f.o.b. New York has risen to \$222-\$227 per flask from \$220-\$225.

ALUMINIUM IN 1957

In an analysis of world production in 1957, the *American Metal Market* estimates primary aluminium output by United States producers at approximately 1,649,000 s.tons, being a decline of about 2 per cent from the 1,679,000 tons recorded for 1956. This was the first time in six years that a new record for annual production was not set up. Power troubles, a wildcat strike, and market conditions all contributed to the decline.

Canadian production last year was also lower than in 1956, primarily because of the prolonged strike which kept nearly half the country's smelting facilities idle. Other factors such as power interruption also contributed to the restriction of 1957 output, which totalled about 560,000 tons as against 620,000 tons in 1956. Total North American production amounted to about 2,210,000 s.tons as compared with approximately 2,300,000 tons in 1956.

On the other hand, world production as a whole increased, the greatest advance being recorded in Western Europe—principally in France, West Germany, Austria and Italy—where output rose from

675,000 tons in 1956 to 714,000 tons in 1957, and in the Soviet bloc. World production is estimated to have risen from 3,705,000 s.tons in 1956 to 3,752,000 tons in 1957.

Based on monthly reports by the Dominion Bureau of Statistics, Canada last year exported more than \$222,000,000 worth of aluminium and aluminium products. Canadian exports of primary aluminium declined in 1957 by about 5 per cent (from 508,996 tons to 479,409 tons).

The most significant development in the world aluminium picture is considered to be the continued steep rise in Soviet production. Russia itself is reported to have increased primary aluminium output by 21 per cent to the new record total of 603,000 tons, thereby displacing Canada as the world's second largest producing country. On a regional basis, the Soviet group of countries produced 708,000 tons last year. Output in some satellite countries—including Hungary, East Germany, Czechoslovakia, and Poland—declined by an estimated 29,000 tons, but this loss was more than offset by Russia's own increase of 103,000 tons.

The West German productive capacity for aluminium, which rose from 160,000 tons in 1956 to 165,000 tons last year, is not expected to be expanded further to any notable extent in the next few years, states the Aluminium Werke Nuernberg Co., in a report on the development of the aluminium market. Virgin aluminium production rose to 153,838 tons in 1957, which was 4.4 per cent more than in the previous year. The energy and raw material supply position was satisfactory, throughout the year, but sales become more difficult because of favourable offers of imported aluminium.

U.S. ANTIMONY PRICE CUT

The National Lead Co. has reduced its price of antimony in the United States by 4 c. a lb., with immediate effect. This is the first change in price since August 17, 1955, when quotations were raised by 4½ c. The new price for the company's RMM brand is 29 c. a lb. in bulk f.o.b. Laredo, Texas, and that of the Lone Star brand 29½ c. The reduction is ascribed to reduced demand. In the United Kingdom, English 99 per cent continues to be quoted at £190.

According to the British Bureau of Non-Ferrous Metal Statistics, United Kingdom consumption of antimony metal and compounds (in terms of antimony metal) declined in December to 356 tons from 430 tons in November. Total consumption for 1957 amounted to 4,622 tons, which compares with 4,345 tons in 1956.

Apart from use in oxides other than for white pigments, which rose to 109 tons in December from 80 in November, all the main trades absorbed less antimony in December. The biggest drop was in batteries, for which only 49 tons were used in December against 115 tons in the previous month.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Apart from zinc, metals have stood up very well during the last week to the stream of pessimistic economic news which has appeared from day to day in the Press: the zinc market has become weak largely due to the unsatisfactory news of the U.S. motor-car industry.

NEARING TARIFF LEVEL

The whole structure of the world's copper market has again become unsteady owing to the reduction in the price quoted by U.S. customs smelters, which is now 23 c. per lb., and the main question at the moment is whether the U.S. producers will have to lower their price to such a level as will result in a U.S. domestic quotation for March being below the 24 c. per lb. level. In the event of this level being reached, the President of the United States is obligated to impose a duty of 2 c. per lb. on the import of copper, and although this level cannot go below 1.7 c. per lb. in consideration of obligations under G.A.T.T., the position is by no means clear. It can, in fact, be argued that even if this happens, the London market has already discounted the fact and therefore any further weakness can only be of a temporary nature.

One of the unresolved questions of the week has been whether there is or is not

a shortage of electrolytic copper in Europe as opposed to the U.K. If there is a shortage in Europe, then it must be borne in mind that to reverse the flow of copper, which at the moment is running from Europe to America, it will be necessary for the European price to go up sufficiently to reverse the calculation in as far as the freight rate is concerned, and on this basis a jump of £20 per ton would not be out of the question.

Business in general remains satisfactory and one of the main items of interest at the moment is where the Russians are going to place their 1958 order for wire. Some reports suggest that a limited tonnage will be placed direct with Chile, but it is not considered that the tonnage supplied by Britain is likely to suffer to any great extent, as the Chilean order will probably be at the expense of German fabricators.

In the United States business is still declining, but it must be remembered that figures at this time of the year are likely to be influenced by the weather, which has been exceptionally bad during the last few weeks. Business actually booked in January by brass and wire mills was the lowest since July, 1949, and with the automobile industry in its present state, orders are not expected to pick up for some months.

NO RISE IN BUFFER STOCK

The tin market in London has remained relatively steady, whilst that in Singapore was very firm until Wednesday. Stocks in the United Kingdom showed a further increase of 790 tons on Monday, but the buffer stock manager has not had to absorb any of this, unless he has been paying more than his basis price of £730 per ton. Most experts consider it will be another few weeks before the full effect of the export quotas become apparent in London, but that when this stage is reached prices will advance fairly rapidly.

The latest statistics issued by the International Tin Council show that the estimated production of metal outside the U.S.S.R. during 1957 was some 170,000 tons against 177,000 tons in 1956. Against this, consumption was probably slightly above the 1956 figure of 160,000 tons. These figures indicate that the surplus for the year was probably well in excess of 20,000 tons, when consideration is given to the exports of tin from the U.S.S.R. On Thursday morning the Eastern price was equivalent to £753½ per ton c.i.f. Europe.

LEAD STEADY—ZINC WEAK

The lead market has remained steady owing to continued demand for metal for prompt shipment to the United States, which has also caused the continuation of a backwardation. Demand in America is being affected by the depression in the motor industry, but in this connection the fact must not be lost sight of that the older the cars on the road, the more replacement batteries are required. In Europe, however, the motor industries in both the United Kingdom and Germany are still beating records, and demand for the metal remains good.

During the week the zinc market has developed a weak undertone, but it would be surprising if the price fell very much further, as steps to curtail output are now beginning to have their effect. The production in O.E.E.C. countries amounted to 69,623 tonnes in January, 1958, as compared with 73,273 for December, 1957. Production for 1957, however, showed a substantial rise over that for 1956 at 840,402 tonnes against 815,935. In America, the same pattern can be seen in that the production of zinc from domestic mines during the first four months of 1957 was higher than the average monthly rate for 1956, but by the end of the year the total tonnage produced showed a decrease of some 4 per cent, with production still falling.

Closing prices are as follows:

LONDON METAL AND ORE PRICES, FEB. 27, 1958

METAL PRICES

Aluminium, 99.5%, £197 per ton	Iridium, £26 oz. nom.
Antimony—	Lanthanum (98/99%) 15s. per gram.
English (99%) delivered, 10 cwt. and over £190 per ton	Manganese Metal (96%-98%) £310
Crude (70%) £190 per ton	Magnesium, 2s. 5½d. lb.
Ore (60%) basis 19s. 6d./20s. 6d. nom. per unit, c.i.f.	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osium, £25 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 10s. 0d. lb.	Palladium, £7 10s. 0d.
Cerium (99% net), £13 18s. lb. delivered U.K.]	Platinum U.K. and Empire Refined £27/10 oz.
Chromium, Cr. 99% 7s. 2d. lb.	Imported £25 oz.
Cobalt, 16s. lb.	Quicksilver, £76/£77 ex-warehouse
Germanium, 99.99%, Ge. kilo lots 2s. 8d. per gram	Rhodium, £40/£42 oz.
Gold, 249s. 9½d.	Ruthenium, £15/£18 oz. nom.
	Selenium, 50s. 0d. per lb.
	Silver, 76½d. f. oz. spot and 76½d. f.d.
	Tellurium, 15s. 16s. lb.

ORES AND OXIDES

Bismuth	30% 5s. 0d. lb. c.i.f.
Chrome Ore—	20% 3s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable) 48%	£17 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	£18 0s. 0d. per ton c.i.f.
" Refractory 40%	£12 5s. 0d. per ton c.i.f.
" Smalls 44%	£16 5s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O	£26 5s. per ton f.o.b. Beira
Magnetite, ground calcined	£28 0s./£30 0s. d/d
Magnetite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 77s. 6d. freight	nom.
Manganese Ore (43%-45%)	nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ (prompt delivery)	£39/£41 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO ₂	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	95s. 0d./100s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90-95% V ₂ O ₅	£10 per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO ₂)	£16 per ton c.i.f.

	Feb. 20		Feb. 27	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash	£162½	£163	£160½	£160½
Three months	£163½	£164	£161½	£162
Settlement		£163		£160½
Week's turnover	6,375 tons		7,375 tons	
LEAD				
Current ½ month	£75½	£75½	£73½	£73½
Three months	£74½	£75	£73½	£73½
Week's turnover	3,650 tons		3,800 tons	
TIN				
Cash	£733	£734	£731	£731½
Three months	£735	£736	£735½	£736
Settlement		£734		£731½
Week's turnover	805 tons		1,250 tons	
ZINC				
Current ½ month	£64	£64½	£61½	£61½
Three months	£63½	£63½	£62	£62½
Week's turnover	2,925 tons		4,575 tons	

Mining Finance

What Price Expansion?

The long-term plans for expansion undertaken by Messina (Transvaal) Development Co. in recent years have been making good progress during the last twelve months. Indeed, with the coming into production of M.T.D. Mangula the company now controls three producing copper mines and is pushing ahead with mining operations, in one form or another, at no less than seven other properties. These facts point unmistakably to Messina developing into a much larger and more important mining complex than is sometimes appreciated by the investor, who is apt to view the company as but the owner of a single copper-producing mine.

The prosperous years following on the Korean War enabled Messina's expansion plans to be largely financed out of profits. But the persistent weakness in base metal prices, particularly copper, from the early part of 1956, has rendered down Messina's profit-earning capacity to the point where it can do little more now than look after its own backbone—the Messina Mine—and its shareholders.

This is not to say that Messina has tried to expand at a greater rate than either its resources or the generally acknowledged outlook for base metal prices would permit, but rather it underlines the fact that mining deposits require considerable capital investment over a number of years before they can be made to earn their keep.

Little surprise, therefore, should arise from the reading of the company's consolidated balance sheet accompanying the report and accounts for the year ended September 30, 1957, published this week. There, it will be seen that current liabilities are running ahead of assets, and that expenditure on mining properties, valued at over £7,250,000, is balanced against an issued equity of only £330,000. In any

event, Messina has not sufficient capital available to underpin its now widespread activities. More funds are obviously needed but how these are to be obtained is not readily ascertainable.

In the first place, the company is precluded from going to the market itself until the last option date expires on the 650,000 issued share options at £2 per share in 1959. It was, therefore, unfortunate that the offer of M.T.D. Mangula shares to the market did not meet with the success it could have justifiably expected when the copper price was much higher.

All that being so, the company may have to resort to a loan privately placed or, to a debenture issue which, if it were to have conversion options dated 1960 into either Messina itself or into Mangula, could prove to be a successful solution to the company's present difficulties.

O.T.C. STATUS FOR CHARTERED

The British South Africa Co. announce that they have been advised that, subject to their taking certain steps, including the hiving-off of certain non-eligible interests, the company's mining and estate interests in Rhodesia should qualify for O.T.C. benefits under the Finance Act, 1957.

A first step has been taken by Chartered in forming a new company, B.S.A. Co. Investments.

RHO-ANGLO ISSUE FOR BANCROFT

Towards the end of last year it was announced that means were being sought to place the financing of Bancroft Mines, the new Copperbelt producer, on a more

permanent basis. Since then, the picture has altered somewhat, due to the internal reorganization of Rhodesian Anglo American's production, which involved the stopping of actual production at Bancroft for one year. A scheme has now been made public which will achieve the original object in the light of later developments.

The present position is that Bancroft carries short-term loans totalling £6,500,000, £3,500,000 of which is repayable in November this year and the remainder between then and 1962. The company's funds, however, are now known to be insufficient for the revised programme caused by the copper cut-backs, and another £1,000,000 is needed.

The new scheme falls into two main sections: the repayment of the present loan capital and the additional £1,000,000 (which is to be provided by Anglo American and added to the £3,500,000 shown above); and the provision of permanent finance.

The first step taken is the alteration of the repayment dates for all the above loans, so that the entire £7,500,000 will fall due on April 1, 1959. Repayment can take the form either of cash, or, what is more likely, the issue of 7,500,000 cumulative redeemable preference shares of £1. These latter will participate to the extent of 1 per cent (in addition to the basic 6½ per cent) for each 5 per cent declared on the ordinary shares, with a maximum total of 12½ per cent, and will be redeemable at 110 per cent in 1971 or after. In consideration for these provisions, Bancroft will grant the participating companies options over 3,000,000 ordinary shares at 20s. exercisable until 1963. Bancroft's final structure will thus be: Ordinary shares, 22,000,000 issued, 3,000,000 under option; Preference shares, 7,500,000 cumulative preference (participating, and redeemable after 1970); and the present £5,000,000 loan from Anglo American and Chartered repayable or convertible into notes at the end of 1960.

As a necessary concomitant Rhodesian Anglo American is to make a rights issue of £4,000,000 6 per cent loan stock at 95. All but £100,000 of this will be offered to Rho-Anglo's ordinary stockholders at the rate of £3 of loan stock for every 10 units held. Holders may also apply in the usual way for any stock not taken up, in addition to the £100,000 surplus. The loan stock will carry options at the rate of one option at 80s. for every £4 nominal of loan stock, exercisable until 1963, and an option may be exercised either by subscribing 80s. in cash or by the surrender of £4 loan stock.

There should be no doubts about the issue's success, for the high coupon should interest institutional investors, while the conversion options (at an effective price of 76s. if loan stock is surrendered) must be most attractive to private investors who are prepared to take a bullish five-year view of the base-metal situation—and in this connection it should not be forgotten that Rho-Anglo shares were as high as 108s. 9d. only last year, while in previous years points as high as 128s. and 126s. have been reached.

RAND, KLERKSDORP AND O.F.S. GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for the calendar years 1957 and 1956

Heading		Jan. to Dec.	Rand Cos.	Klerksdorp Cos.	O.F.S. Cos.	Total
Tons milled :	Millions	1957 1956	50.2 54.0	6.1 4.1	9.8 9.4	66.1 67.5
Ounces produced :	Millions	1957 1956	10.5 10.9	2.2 1.3	3.8 3.2	16.5 15.4
Grade per ton :	Dwt.	1957 1956	4.19 4.02	7.39 6.56	7.72 6.73	5.00 4.55
Working costs per ton : s.d.		1957 1956	42/3 40/5	52/6 50/11	56/10 53/5	45/4 42/11
Working profits :	Gold £m.	1957 1956	26.1 28.1	12.2 6.4	19.5 14.8	57.8 49.3
Working profits :	Uranium £m.	1957 1956	18.2 15.8	8.9 4.4	6.2 4.5	33.3 24.7
	Total £m.	1957 1956	44.3 43.9	21.1 10.8	25.7 19.3	91.1 74.0
Dividends declared : (net total)	£m.	1957 1956	19.2 19.1	8.1 3.4	9.4 5.7	36.7 28.2
Non-European employees at end December :		1957 1956	211,000 228,000	34,000 26,000	55,000 54,000	300,000 308,000
Number of Companies included		1957 1956	37 40	7 6	10 11	54 57

St. John d'El Rey Enters The Iron Age

With the news from Cleveland that the M.A. Hanna Co. (through a subsidiary and in association with Leo Model, of New York) has acquired the controlling interest in St. John d'El Rey, a long story of rumour and counter-rumour comes to an end.

For many years the shares of this 125-year-old company had been almost ignored. In only two of the eight years 1948-1955 did the shares go higher than 29s., and at one time in 1955 they were as low as 11s. 3d.

This was a state of affairs to be expected of a company making very small profits from its gold mining operations and often having to struggle to keep its head above water.

The first indication that anything was afoot was a gradual but persistent rise in d'El Rey shares which began about May, 1956. It was soon realized that American interest in St. John's iron must be the answer, but no official news was forthcoming until October—in fact, in July the chairman said that there was no "definite proposition" and at the beginning of October the company denied knowledge of any factor which could be causing the bull market in the shares (by this time d'El Rey were up to 62s.). When the shares reached 64s., however, the firm announced that plans were being negotiated for long-term exploitation of the iron, gold and other minerals in partnership with "a leading U.S. mining company".

The next stage in the timetable is January, 1957. The shares are now as high as 87s. 6d. and the company monthly losses from gold are averaging about £60,000. On January 18, the company stated that negotiations with "the leading U.S. mining company" (identified to be M.A. Hanna and Co.) had been broken off, that it believed that more than 50 per cent of the stock was in American hands, and that Mr. H. T. Osborne, representing a large body of American stockholders, and Mr. I. Kerman, a London associate, had become directors, Mr. Kerman being appointed chairman.

In June, 1957, the emphasis switched temporarily to gold. St. John d'El Rey was having difficulty in paying its employees, and the Brazil Government was making short-term loans while it considered proposals for aid to the company. Closure was out of the question since an indemnity of between £3,000,000 and £4,000,000 would have been payable to d'El Rey's workers, and 40,000 people would have their source of livelihood removed. The directors visited Brazil and, while there, granted an option for one year over 75,000 shares at 50s. to a Dr. M. M. de B. Lins, who was also appointed senior legal adviser in Brazil.

By October, borrowings from the Bank of Brazil totalled £580,000 and the Bank had indicated that the limit had been reached. There was to be no more borrowing, and the amount outstanding was to be repaid by instalments commencing in October, 1958. The company (under the chairmanship of Mr. Kerman), therefore, came to an arrangement with Mr. Model. This arrangement consisted, on Mr. Model's side, of the loan of £65,000 and the procurement of subscribers for £200,000 debenture stock, convertible at prices from 40s. to 60s. In return, Mr.

Model was to have a personal option over a further £800,000 of convertible debentures. Every £1 nominal of debenture stock carried one vote at general meetings.

In January this year, a Brazilian Government Commission came to the aid of the company's gold operations with a subsidy based on the cost of production plus £60,000 per annum for depreciation. At the same time Mr. Model revealed in New York that he had granted an option to the M.A. Hanna Co. over a "substantial part" of his holding.

Thus we arrive at the present circular from the M.A. Hanna Co. St. John d'El Rey's iron ore deposits, believed to be the largest in Brazil, in turn containing the largest high-grade reserves in the world, are to be prospected immediately, and a study of transportation and dock facilities is to be made. Should these and general economic factors warrant it, the deposits will be brought to a self-supporting basis within about three years, with rapid expansion thereafter.

The lesson to be learnt from the whole *affaire* is obvious. Information throughout this exciting period has been scanty to such an extent that the shares have been moved almost entirely by speculation and rumour, ignoring whatever news has from time to time been available from the company. This is advantageous to no one, and those shareholders who provided the risk capital must feel, with some justification, that their interests have not been studied as closely as they might have been.

HIGH VALUES AT CORDOBA

Further results have been announced of the drilling programme at Cordoba Mines at Red Lake, Ontario, in which Western Selection and Development Co. and its subsidiary, Anglo Barrington, hold approximately 30 per cent. They include some extremely high values over good widths, ranging up to 1.04 oz. and 2.76 oz. over borehole widths of 5 ft. The latter value was at a depth of only 280 ft. and, the report states, values were intersected throughout the drill cores.

During the current season further geophysical surveying is being carried out, while as soon as climatic conditions permit, trenching and bulldozing will be started.

On the strength of this and other reports Western Selection and Anglo Barrington have increased their stake in Cordoba.

KONONGO'S GOOD YEAR

The year ended September 30, 1957, was a bumper one for Konongo Gold Mines (Ghana). Preliminary figures published this week show that net profit, after all charges, was more than doubled and rose from £45,504 to £104,304. Some recovery from the low 1956 figure was, of course, expected, in view of the interruption of production by a 14½-week strike that year, but the present figure nevertheless represents a substantial improvement on previous results.

The reason for the rise is not stated, but it appears that the major contributory factor must have been the economies involved in running the plant at a steady 5,000 tons per month (against throughputs varying from 1,900 to 4,400 tons in previous years) since there appears to have been no significant increase in the grade milled in 1957.

Out of the doubled profits, Konongo is making a final distribution of 6d. per share, which, with 2d. declared previously, makes 8d. per share for the year against 3d. last year. This year's final, however, includes 2d. arising from the writing-back of taxation no longer required in view of the company's O.T.C. qualification.

DIFFICULT DAYS FOR PETALING

Petalting Tin has been a poor market recently and the price of the \$M1 shares fell at one time to 3s. 6d., their lowest for several years. This depressing situation is the result of the publication of the company's report and accounts for the year ended October 31, 1957, in which the chairman, Mr. J. T. Chappel, is not recommending a dividend payment and, indeed, emphasizes in his statement from the chair that the company's return to the list of dividend-payers is "dependent on a substantial improvement in returns". This, in turn, is dependent upon the relaxation of quota restrictions which, at the present rate, will only permit Petalting to produce about 90 per cent of last year's output.

The outlook for the current year in many respects is otherwise good. As the company's No. 6 dredge will enter virgin ground in April or May next, which is expected to bring proved returns, there should be no difficulty in reaching the quota figure, particularly as the area allocated to the No. 3 and No. 4 dredges should prove to be as remunerative as they proved to be during the year to October 31, 1957. Moreover, it is almost certain that the price received will be considerably higher than that received during 1956-7.

The crux of the matter appears to be Petalting's liquid position, which at present is somewhat obscure. A considerable proportion of the company's net assets is held in the form of dated government securities, which Petalting is not unnaturally averse to realizing at a loss in view of their intrinsic appreciation. Because of this, last year's heavy capital expenditure commitments were met by means of an increased overdraft, the interest on which reperculated on the profit and loss account. After debiting this loan, Petalting's net current assets stood at £472,274 at the date of the balance sheet. This is reasonable, but certainly not unduly strong compared with the capital expenditure still to be incurred.

Lower Normetal Earnings.—Net earnings of Normetal Mining Corporation in 1957 were sharply reduced to \$602,000 against \$2,616,904 in the previous year. The 1957 figure is equivalent to 16 c. per share against 70 c.

MARKET HIGHLIGHTS

After pausing for a while on fears that profit-taking would develop in front of the week-end, the firmer trend in South African gold shares was later resumed in the week to February 26. Again, there was no noticeable expansion in the admittedly low level of business, but there was a fairly confident undertone to the market and prices steadily edged upwards. Elsewhere in the House, conditions were far more bleak and desolate than even the February snows outside.

Little further was seen in London of the previously reported U.S. buying of gold shares, but reports from Johannesburg suggested that some American activity had been channelled through that centre.

Price movements in London, though small, were fairly widespread. Established dividend payers came in for a modest inquiry, among them East Geduld (22s. 9d.) and Marievale (13s. 4½d.) were sought after. Geduld (61s. 10½d.) were also bought, being thought additionally attractive in view of the fact that the bulk of their market valuation was represented by their East Geduld and Grootvlei holdings. Also good were Daggafontein, the rise in the shares of 3s. to 29s. 6d. largely resulted from the fact that a sudden demand—U.S.-inspired, some thought—disclosed a shortage of shares in the market.

Among the newer mines, Free State Geduld rose 2s. 6d. to 82s. 6d. on talk of more high development values and St. Helena rose to 38s. 6d. on hopes that the March batch of dividends will include a payment of 1s. for that company. "Of-sits" moved up to 59s. 6d. and in the Finance group, Central Mining became a good market at 59s. 3d. to the accompaniment of suspected U.S. interest. Union Corporation rose to 38s. 7½d.; earlier, unconfirmed Cape rumours suggested that Union Corporation might be making a £2,000,000 note issue for the purpose of financing Winklaaak to production. Elsewhere, "Freddies" improved sharply to 4s. 6d., but no very obvious reason appeared to be behind the buying.

Diamond and Base-metal shares, normally sensitive to Wall Street, remained unresponsive to the protracted decline in New York. Very little business was reported and in the absence of any sizeable selling the mere existence of several large bear positions was sufficient to stop prices from sliding away.

Bancroft recovered on some bear-closing to 13s. and "Rhoanglo" stayed rock steady at around 51s. 3d.; the big capital-raising plans affecting these companies were not known during the period under review. Occasional selling took place in Consolidated Zinc (44s.) but other Lead-Zincs showed little movement. Tins were practically motionless, apart from a one-day revival of Eastern inquiry which may or may not have been inspired by the strength of tin in Singapore on that day.

A further step towards the eventual exploitation of the big iron ore deposits at St. John d'El Rey took the form of an announcement to the effect that the M.A. Hanna Co., of Ohio, together with Leo Model, of New York, and associates, had acquired a controlling interest in d'El Rey. This confirmed the earlier presumption that the Americans were in control of the company and were pressing on with their plans for the iron ore. Accordingly, d'El Rey moved up 2s. 6d. to 55s.; the

BARROW HEPBURN & GALE

DIFFICULTIES OF SOLE LEATHER INDUSTRY

The 37th ordinary general meeting of Barrow Hepburn & Gale Limited will be held on March 21 in London.

The following are extracts from the Statement by the Chairman, **Mr. George W. Odev, C.B.E.**: While we have been successful in reducing our losses in connection with the production of sole leather, we have in almost every other department of our activities encountered difficulties which, although they are now largely overcome, have undoubtedly had an adverse effect upon the Company's profits.

We have very extensive interests in the production of rubber transmission and conveyor belting and we have been particularly successful in the production of plastic conveyor belting for the mines. We have secured regular orders in this country from the National Coal Board and we have also obtained substantial orders overseas. **Manufactured Leather Goods:** We have opened up a new department for the production of men's waist belts, which we are now marketing under the name of "Tower" brand. We have also installed the most modern plant for the production of fibre moulded travel cases, which we are now selling in substantial quantities under the brand name of "Python". These are in addition to our existing well-known "Pakawa" and "Blackbird" productions.

This department, in common with the whole of the manufactured leather goods industry, continues to suffer severely from the imposition of a 60 per cent. Purchase Tax.

We have during the past year completed the concentration of the production of curried and textile leathers at the tannery of Thomas Holmes and Sons, Limited at Sculcoats in Hull. As a result we have been able to effect considerable economies in the cost of production but

it will not be until the early part of 1958 that we shall begin to derive the full benefits.

Sole Leather Industry

The main core of our problem remains the position of the sole leather industry and this continues to cause us very great anxiety.

During 1957 more sole leather tanneries have closed and others are working on short time. Various plans put forward to assist in the rationalization of the industry have met with little response. In these circumstances it would appear that trading conditions in the sole leather industry in 1958 are likely to continue to be difficult.

On the other hand, it must be added that the general public are becoming increasingly "leather conscious" and people are more and more insisting upon being able to distinguish—when making a purchase of shoes—between real leather and synthetic soling materials.

We have taken vigorous steps to improve the quality of our sole leather productions in every way and to meet the specialized requirements of individual shoe manufacturers.

We have developed an entirely new range of productions, including a new sole leather with guaranteed wear, which we have placed on the market under the registered name of "Mantan".

We fully intend in the coming year to continue to effect every possible economy in the working of the company and, when eventually some equilibrium has been reached as between leather and substitute materials in the shoe industry, and the sole leather industry is once again in a healthy condition, we can expect the profits of the Company to become more commensurate with the capital and the turnover which in these difficult times we have been most successful in maintaining.

REQUIRED: OPPORTUNITY TO PROSPECT in any part of the Tropics. Experienced diamond and churn driller, bush work preferred, age 30, seven years' mining and prospecting (alluvial and lode) experience. Box No. 615, *The Mining Journal, Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

FOR SALE—"Star" Vertical Percussion Boring Rig on crawler tracks; fitted International UD.6 diesel engine. In good working order. Reasonable offer accepted. Lying Glasgow area. Box No. 618, *The Mining Journal, Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

(Continued from previous column)

Preference, previously a rather nominal market, revived sharply with a rise of 3s. 6d. to 15s.

Elsewhere, another piece of good news occurred in the West African Gold market in the shape of a particularly encouraging dividend from Konongo. This lifted Konongo 5½d. to 2s. 1½d. and aroused hopes regarding the forthcoming Ariston payment.

THE PROPRIETOR of British Patent No. 703041 for "Improvements in or relating to Separating Apparatus for Solid Material", is desirous of entering into negotiations for the sale of the Patent, or for the grant of a Licence thereunder. Communications should be addressed to Page, White and Farrer, 27 Chancery Lane, London, W.C.2.

NATIONAL COAL BOARD DURHAM DIVISION QUARRY MANAGER

Required for the National Coal Board's Marsden Quarry, South Shields. Salary will be within the range £900-£1,400. Applicants should have had experience of quarry working and supervision of men engaged in quarrying operations. Apply, within seven days, giving details of age, education, qualifications and experience, to: Area No. 1 Staff Manager, National Coal Board, Station Road, South Shields, Co. Durham.

MINING MISCELLANY

A Perkins' mobile school left Britain recently for a four-month, 10,000-mile instruction tour of Germany, Belgium, Holland, Austria, Switzerland, and Italy.

The shortage of miners for the Limburg coal mines has come to an end. Recruitment in Italy has been stopped. The only remaining shortage is in pithead workers.

Hungary's newest and largest open-cast coal mine, situated at Bántapuszta, Western Hungary, will produce 330,000 tons of coal this year. Most of it goes to the Inota power station.

A new company, Northwind Explorations Ltd., has been formed to explore a molybdenum-gold prospect on the east shore of Lake Nipigon, Northern Ontario.

The Government of Mysore will shortly set up a Mineral Development Board through which the State can take effective measures for the exploitation of mineral resources. The board will work on commercial lines.

Inland Steel Co., of Indiana, U.S.A., is to construct an experimental pilot plant at its works at Indiana Harbour for the smelting of iron ore by a new process developed in its research laboratories. No details of the process have been disclosed.

The Boliden Mining Co. is to expand its lead mine at Idre, in the province of Dalarna, Sweden, at a cost of some 16,000,000 kr. The mine is expected to yield about 150,000 tons of ore per annum, or about 12,000 tons of ore concentrate with 74 per cent lead content.

As an inducement to foreign and domestic capital to play an increasing part in the development of Burma's minerals, the Union Government has said that expenses incurred by firms in connection with the exploitation of mineral and oil resources will no longer be liable to income tax.

The Du Pont Co. is to take over operation of the Trail Ridge and Highland ilmenite mining operation in Florida, U.S.A., from the Humphreys Gold Corporation, which started up the mines for Du Pont ten years ago. Ilmenite is used by Du Pont in the manufacture of titanium dioxide pigment and as the raw material for titanium metal.

The Ministry for Industry, Indonesia, has announced that, as from March 1, the mixed Dutch and Indonesian enterprise known as the NV Gemenschappelijke Mijnbouw Maatschappij—the Billiton tin mine—will be operated directly by the government.

The value of mineral production in Northern Rhodesia dropped from £130,148,615 in 1956 to £96,352,691 last year. The figure for blister copper fell from £47,271,995 to £34,200,053 and that for electrolytic from £73,729,521 to £54,200,053.

Demag is building what is claimed to be the world's most modern ore unloading facility. Costing about £2,000,000, it

consists of three unloaders each of which can handle 18 tons of ore every 45 secs. The customer is the Chesapeake and Ohio Railway.

Z. R. Holdings Ltd., the Australian rutile and zircon producer, has again reduced its output. Production of saleable minerals for the last quarter of 1957 totalled 4,555 tons, compared with 7,746 tons in the preceding quarter and 10,708 tons in the three months ended June 30.

Barclays Bank D.C.O.'s *Overseas Review* reports that at Mavis Bay, about 18 miles from Kingston, the capital of Jamaica, preliminary surface stripping continues to bear out preliminary estimates by International Metals Ltd. of deposits of high-grade iron and copper ore in commercial quantities.

A team of French steel industrial leaders is investigating the possibility of building a steel plant at Bone, on the Algerian coast. The plant would be fed with iron ore from the Algerian mines of Ouenza and would be powered with Sahara natural gas. The bulk of Ouenza iron ore is at present sold to Britain.

A large deposit of antimony, much of it high grade, has been found in the White Caps mine in the Manhattan district of Nye County, Nevada, U.S.A. There is estimated to be at least 2,000 tons of high-grade ore, running from 50 to 60 per cent, as well as an estimated 8,000 tons assaying 15 to 17 per cent. The ore will be handled by the flotation process to produce a concentrate of 60 to 70 per cent antimony. All the necessary milling equipment is owned by the White Cap Mining Co.

Large deposits of uranium are alleged to remain unexploited over a vast area in Hazara district, Pakistan. An American geologist recently expressed the opinion that deposits of uranium and other radioactive minerals in this area, if properly exploited, could provide Pakistan with its largest source of foreign exchange earnings.

The Administration of the Banka Island tin mines have confirmed that production is on the decline, because of the poor mechanical condition of the excavating machines in use. The Antara news agency reports a mine manager as stating that 70 to 80 per cent of the tin production is being undertaken with old equipment.

The North-Western Gas Board—acting for the Gas Council—is to sign a £2,000,000 contract for Britain's first plant for producing gas by the hydro-generation of oil or low-grade coal, which is to be sited at Partington, near Manchester. The plant will have a capacity of 7,500,000 cu. ft. of gas a day. The contractors are Humphreys and Glasgow.

North Gaspe Mines, of Montreal, Canada—a new company—has undertaken under an agreement to renew surveying and development work to ultimate resumption of production of the base-metal properties of East Macdonald Mines in North Gaspe, Quebec, East

Macdonald acquired these properties from Consolidated Candego Mines in 1954, when the latter company went bankrupt.

A five-man Commission has been appointed to enquire into concessions governing mining, oil and timber operations in Ghana. The enquiry will open on March 7 and the Commission will sit at Accra, Oda, Kumasi, Obuasi, Tarkwa, and other places specified by the Commissioners. The Minister of Trade has directed it to finish its work by September 30 and send in a report and recommendations.

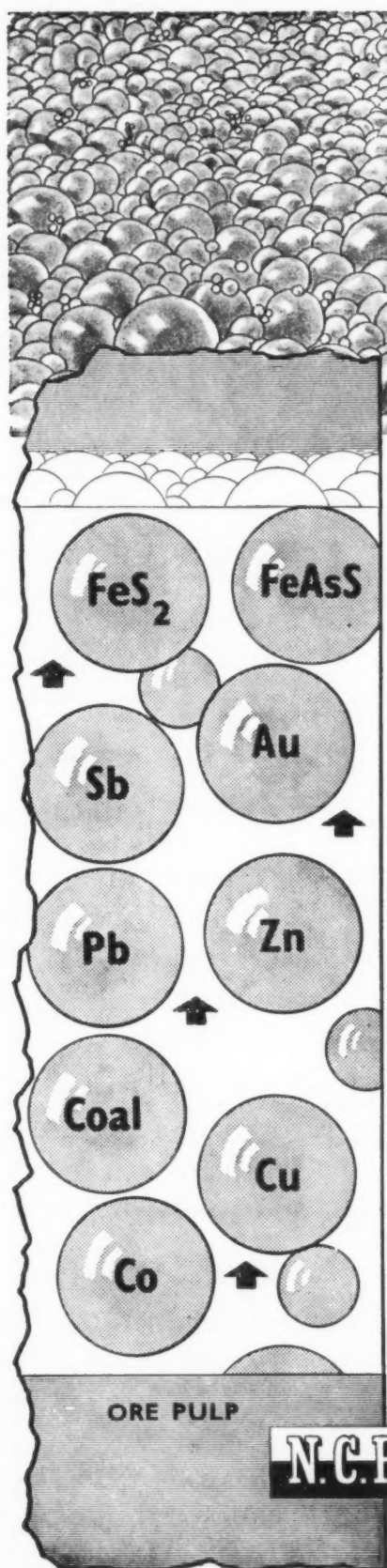
A law granting the Caja de Creditor y Fomento Minero (Chile's Mine Credit and Development Organization) funds to maintain its 29.5 c. per lb. payments for copper has gone into force. The rate applies to small and medium mines. Funds have been made available from the one-per-thousand tax on foreign money transactions, which is expected to raise 3,000,000,000 pesos this year. The Act will prevent unemployment in small and medium mines. This sector of the industry produces about 40,000 tons of copper a year.

A new nickel mine came into being in Western Canada, when Western Nickel Ltd. made its first shipment of nickel concentrates to the Sherritt Gordon refinery at Ft. Saskatchewan. The Western Nickel property is located near Hope, B.C., and has a reconditioned plant with an estimated capacity of 500 tons per day. Full capacity is not expected to be reached for some time. Ore reserves are placed at 1,300,000 tons averaging 1.39 per cent nickel and 0.5 per cent copper. The company is owned 46.12 per cent by Newmont Mining Corporation. Fixed price contracts have been made for the sale of substantial quantities of nickel in 1958, 1959 and 1960.

A new company has been formed to develop the Gaboon territory of French Equatorial Africa. It plans to concentrate on the areas surrounding the iron ore deposits of Mekambo and along the 700 km. railway which is likely to link the mines to the sea. The company is named "Spemiag" (Société d'Etudes pour l'Équipement Minier, Industriel et Agricole du Gabon). Its founders include the Suez Canal Co., the Banque de Paris, Cofimer, etc., which together hold 25 per cent of the shares; and a group of foreign companies, including Ferrostaal and Sofina, which also hold 25 per cent. The remaining 50 per cent is being subscribed by the local Gaboon Government.

Output of aluminium by Brazil's two producers—Cia Brasileira de Alumínio, Sorecaba, and the Electroquímica Brasileira, Saramanha—was between 16,000 and 17,000 tonnes in 1957, compared with 6,278 tonnes in 1956. Nevertheless, the plants were not working to capacity. A third reduction plant may be set up by the U.S. company, Reynolds Metals, and would be located on the San Francisco River. A report has also been received that the government is to set up a large aluminium plant on the borders

(Continued on page 252)



"T. E. B."
FROTHER
PLUS
 Related Compounds blended to
 suit widely varied ores.

ECONOMICAL! STABLE!
FLEXIBLE! PROVED IN THE PLANT!

N.C.P. Metallurgists will study your problems *on the plant*, and where particular conditions call for special treatment, N.C.P. will provide a blend of alkoxy hydrocarbon frothers to suit your needs.

Manufactured in South Africa from South African materials.

**Use protected by patent*

Apply for information sheet which gives full technical details of physical properties, flotation behaviour and chemical composition.

N.C.P. NATIONAL CHEMICAL PRODUCTS LTD.
 P.O. BOX 344, GERMISTON
 Transvaal, South Africa

Mining Miscellany—Continued

of the States of Bahia, Pernambuco and Alagoas. Bauxite produced in N.E. Brazil would be the raw material. In 1956 Brazil's output of bauxite amounted to 70,000 tons.

PERSONAL

Mr. A. A. von Maltitz, technical director of the Anglo-Transvaal Consolidated Investment Co. Ltd., has been appointed a director.

Mr. W. E. Knox, director of the Administration Division of the Export Credits Guarantee Department, has retired. He will be succeeded by Mr. F. H. Whitaker.

Mr. John D. Barrington has been appointed president and managing director of McIntyre Porcupine Mines Ltd., of Canada. Mr. M. L. Urquhart has been appointed vice-president operations. Mr. S. M. Wedd has been appointed a director. Mr. Barrington, who joined the board of McIntyre Porcupine Mines last year, is currently president and managing director of Ventures Ltd.

We have received from the British Iron and Steel Federation the first issue of a new illustrated magazine entitled *Safety*, which is to be published three times a year. The aim is to keep people in the iron and steel industry continually aware of the need for safe and efficient working, but the magazine is also likely to be of interest to other industries, including mining.

The Royal Astronomical Society has announced the forthcoming publication, in March, of the first number of the *Geophysical Journal*. This new quarterly will be devoted to research in geophysics and related subjects. Papers for publication should be sent to the assistant secretary of the Royal Astronomical Society, Burlington House, London, W.1.

CONFERENCES AND EXHIBITIONS

The American Zinc Institute will hold its 40th annual meeting in St. Louis, Missouri, U.S.A., on April 14 and 15. On the first day the meeting will discuss reports on galvanized steel and other subjects of interest to the zinc industry and zinc producers. On April 15, at a meeting held jointly with the Lead Industries Association, subjects related to both zinc and lead will be discussed. Throughout the meetings speakers will stress practical aspects of supply, demand, technical research and market development.

Two Cantor lectures on the Geological Survey of Great Britain will be delivered to the Royal Society of Arts by Sir William Pugh, director of the Geological Survey and Museum, on March 10 and 17, 1958, at 6 p.m. Applications for tickets should be addressed to the Secretary of the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2.

COMPANY EVENTS

As from March 3, 1958, the address of Knapp and Bates, Ltd., will be 17 Christopher Street, London, E.C.2. Tele-

phone number is Bishopsgate 9022.

The Chemical Division of Armour and Co. Ltd. are moving their offices and from March 10 will be at 4 Chiswell Street, Finsbury Square, London, E.C.1. The new telephone number is Metropolitan 0031.

Clark Equipment International and their British associates, All-Wheel Drive, have announced the conclusion of arrangements for the manufacture of Michigan earth-moving and material-handling equipment in the U.K. Michigan (Great Britain) is responsible for distribution and service in the U.K. and export to Empire and Commonwealth countries. The company's works and service are situated at Camberley, Surrey. Its home and export sales division has opened offices at 3-5 Charles II Street, St. James's Square, London, S.W.

CONTRACTS AND TENDERS**Formosa**

The International Co-operation Administration has announced the following procurement for Formosa: NXL diamond-set impregnated coring bits for hard formation and NXL balanced type reaming shells with "AAA" quality diamonds. Project Implementation Order No. 84-22-034-9-70494. (Invitation No. US-365.) Issuing authority, Central Trust of China, Purchasing Department, 68 Yen Ping Nan Rd., Taipei, Taiwan (Formosa). Closing date: March 17, 1958. B.O.T. Ref.: ESB 4443/58/ICA. Telephone enquiries to Chancery 4411, extension 354.

URANIUM IN SOUTH AFRICA 1946-1956

Published by the

ASSOCIATED SCIENTIFIC & TECHNICAL SOCIETIES OF SOUTH AFRICA
P.O. BOX 5907, JOHANNESBURG, SOUTH AFRICA

Two volumes: Vol. 1, xiii + 546 pp., Vol. 2, vii + 483 pp., illus.
Price £6 6s. (\$18, Canada; \$20, other countries), post free.

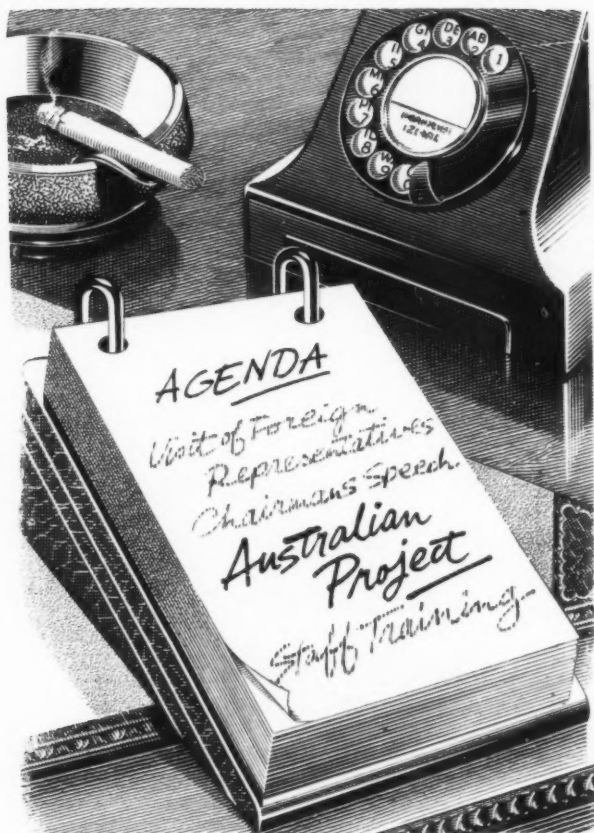
Also obtainable from the Australasian Institute of Mining and Metallurgy, Osborne House, 399 Little Collins Street, Melbourne, Victoria, Australia. Price £A8 4s. 1d., post free.

These volumes contain thirty technical papers with discussions presented at a joint symposium arranged in South Africa from September, 1956, to June, 1957, by:

THE SOUTH AFRICAN CHEMICAL INSTITUTE, THE GEOLOGICAL SOCIETY OF SOUTH AFRICA, THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY, THE SOUTH AFRICAN INSTITUTION OF MECHANICAL ENGINEERS AND THE INSTITUTION OF CHEMICAL ENGINEERS (SOUTH AFRICAN BRANCH).

The papers collected together in these two volumes describe the development of new methods of treatment for the recovery of uranium oxide in South Africa and cover the process thoroughly, especially the geological, mineralogical, analytical, engineering and metallurgical aspects.

An invaluable reference work for metallurgists and chemical engineers handling problems concerning the extraction of uranium from its ores.



The discussion of a new Australian project features prominently on the agenda of many expanding companies today. Such companies will want to know about Australian company law and taxation, and information on these subjects will be found in Australia and New Zealand Bank's booklet "Company Formation in Australia," copies of which will be gladly sent on request.

AUSTRALIA and NEW ZEALAND BANK LIMITED

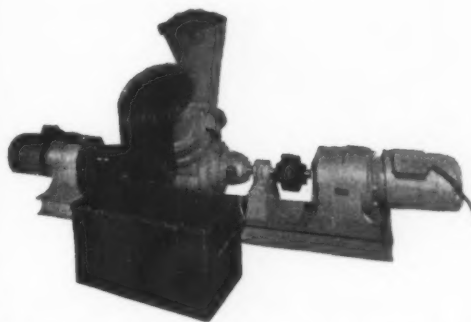


Head Office: 71 Cornhill, London, E.C.3
Tel: AVenue 1281

Nearly 900 Branches and Agencies

COMET

POWERFUL, POSITIVE-ACTION,
SLOW-REVVING PUMPS



A 4" heavy duty pump, driven simultaneously at each end by two 3 h.p. synchronised motors used for such applications as pumping liquorice, tar, soap, etc.

**THE COMET PUMP & ENGINEERING
COMPANY, LIMITED**

JOHNSON ROAD, WEST CROYDON

Telegrams: Comet, Croydon. Telephone: Thornton Heath 3816

ECONOMICS OF SOUTH AFRICAN GOLD MINING

by

R. E. WALLACE and A. S. ROBERTSON

With illustrations by JOHN L. TURNER

THIS book (now available for the first time at a "popular" price) has been specially written for the non-technical mining investor by two Johannesburg accountants in collaboration with a geologist and a mining engineer. It explains how to make full use of the wealth of geological, mining and statistical data, published monthly and quarterly, by the South African groups.

Such information, which is almost invariably reported and commented on in the financial and mining press, often presupposes a degree of knowledge not only of geology and of the techniques of prospecting and mining but also of the limits of economic mining and of the mathematics of share valuation, which many investors do not possess. It is this knowledge which *Economics of South African Gold Mining* supplies.

This book tips no shares, nor does it set out to evaluate the prospects for any particular mine. Its sole purpose is to present the essential background knowledge without which a considered view of this or that South African gold mining share is not possible. It does so in terms which the lay investor can understand, yet in sufficient detail to enable him to put the principles involved to practical use.

PRICE 12s. 6d.

Obtainable from

The Mining Journal, 15 Wilson Street, London, E.C.2.

*Knapp & Bates Dry
Concentration*

**Pneumatic Tables
Pneumatic Jigs
Eluvial Concentrators**

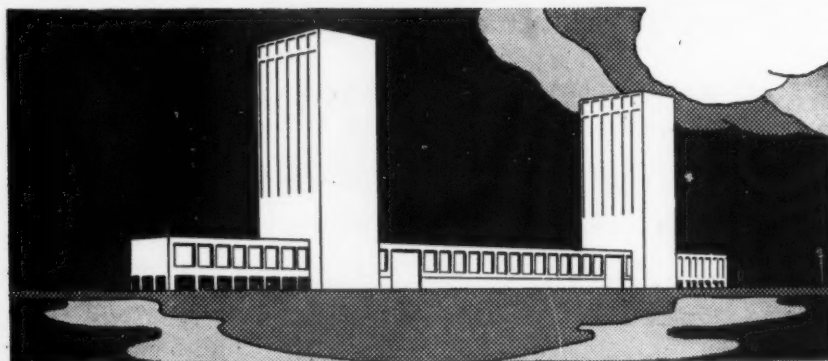
TESTS ON ORE SAMPLES CAN BE MADE IN OUR LABORATORY

KNAPP & BATES LIMITED

17 CHRISTOPHER STREET, LONDON, E.C.2

Telephone: BIS 9022

Cables: FLOWSHEET, LONDON



**SHAFT
SINKING**

BY ANY METHOD—IN ANY PART OF THE WORLD

**BENTLEY WORKS,
DONCASTER**
Tel: 54175 & 54136

The **C**EMENTATION
COMPANY LIMITED

Head Office:
20 ALBERT EMBANKMENT,
LONDON, S.E.11.
Tel: REL. 7654

Metal and Mineral Trades

A. STRAUSS & CO. LTD.

FOUNDED 1875

PLANTATION HOUSE, MINCING LANE, LONDON, E.C.3

METALS

Telephone: Mincing Lane 5551 (10 lines)
Telegrams: Straussar Phone London

Telex GB LN 28858

RUBBER

Telephone: Mansion House 9082 (3 lines)
Telegrams: Ascorub Phone London

MERCHANTS

EXPORTERS

IMPORTERS

Non-Ferrous Metals — Virgin, Alloys, Scrap
RUBBER COPPER REFINERS

Members of the London Metal Exchange

Dealer Members of the Rubber Trade Association

Members of the National Association of Non-Ferrous Scrap Metal Merchants

EVERITT & Co. Ltd.

40 CHAPEL STREET
LIVERPOOL
Tel. Address: Persistent, Liverpool Phone: 2995 Central

SPECIALITY:

MANGANESE PEROXIDE ORES

We are buyers of:

WOLFRAM, SCHEELITE, VANADIUM,
MOLYBDENITE, ILMENITE, RUTILE,
ZIRCONIUM and TANTALITE ORES

Suppliers of:

FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS

BLACKWELLS

FOR ALLOYS

Buyers and
consumers of

- COLUMBITE
- TANTALITE
- TUNGSTEN
- MANGANESE

Makers of FERRO ALLOYS, NON-FERROUS ALLOYS
RARE METALS

BLACKWELL'S METALLURGICAL WORKS
THERMETAL HOUSE, GARSTON, LIVERPOOL, 19

Telephone: Garston 980

Telegrams: Blackwell, Liverpool

Telegrams:
"BASSETT" PHONE, LONDON.

Telephone:
MANSION HOUSE 4401/3.

BASSETT SMITH & Co. Ltd.

(Incorporating George Smith & Son)

15/18 LIME ST., LONDON, E.C.3

METALS,

ORES (Copper, Zinc, Lead, &c., Complex),
RESIDUES, SKIMMINGS & ASHES
NON-FERROUS SCRAP

Telephone:
MON. 5941-3

Cables:
AYRTONMET

Telex:
LONDON 2-2475

AYRTON METALS LIMITED

(Members of the London Metal Exchange)

IMPERIAL HOUSE, DOMINION STREET, LONDON, E.C.3

IMPORTERS AND EXPORTERS OF

NON-FERROUS VIRGIN METALS, SCRAP,
ALLOYS, ORES, MINERALS AND BY-PRODUCTS
containing

BASE AND PRECIOUS METALS

DEALERS IN PLATINUM GROUP METALS

ADVANCES MADE AGAINST CONSIGNMENTS

U.S. Agents

The Ayrton Metal & Ore Cpn., 30 Rockefeller Plaza, New York 20, N.Y.

Cable Address: WAHCHANG, NEW YORK

WAH CHANG CORPORATION

(FORMERLY WAH CHANG TRADING CORPORATION)

233 BROADWAY

NEW YORK 7, NEW YORK

TUNGSTEN TIN

BUYERS

Tungsten Concentrates, Tungsten Tin Concentrates
Mixed Tungsten Ores
Tungsten Tailings, Scrap, Tips, Grindings
Tin Concentrates—Tin Dross, Tin Furnace Bottoms

SELLERS

Tungsten Concentrates to Buyers' Specifications
Tungsten Salts, Tungsten Powder
Tungsten Rods and Wires
Tungsten Ingots, Tin Oxides, Tin Chlorides

PLANT—GLEN COVE, NEW YORK

GEORGE T. HOLLOWAY & CO. LTD.

METALLURGISTS & ASSAYERS,
ORE TESTING, WORKS AND
METALLURGICAL RESEARCH LABORATORIES

Atlas Road, Victoria Road, Acton,
LONDON, N.W.10

Telephone No.:
ELGAR 5202

Tels. & Cables:
NEOLITHIC LONDON

ROURA & FORGAS, LTD.

Telephone No:
GERRARD 9641

Sole Sterling Area Suppliers of

ITALIAN QUICKSILVER

COLQUHOUN HOUSE,
27/37 BROADWICK STREET, LONDON, W.1

RHONDDA METAL CO. LTD.

1 HAY HILL, BERKELEY, SQ., LONDON, S.W.1.
Works: PORTH GLAM.

PHOSPHOR COPPER,
PHOSPHOR BRONZE, LEAD BRONZE,
GUNMETAL, BRASS

Telephone: MAYFAIR 4654

Cables: RONDAMET

J. LOWENSTEIN & CO. LTD.

GREENWICH HOUSE,
10/13 NEWGATE STREET, LONDON, E.C.1
Telephone: City 8401 (7 lines)

ORES - METALS - RESIDUES

**MINING &
CHEMICAL
PRODUCTS
LIMITED**

</

THE CHROME COMPANY LTD.

Transvaal Chrome Ores


AVAILABLE FOR PROMPT SHIPMENT

103 MOUNT STREET • LONDON • W.I.

Telephone
HYDE PARK 9951

Telegrams
ORECOS LONDON

Telex
ORECOS LONDON 2-3290



**METAL
SUPPLIES
Ltd**

Buyers

NIMONIC

And All Other Nickel Alloys

72 VICTORIA ST. LONDON S.W.1

Phone: VICTORIA 1735 (3 lines) Grams: METASUPS, WESPHONE

"Tropag"

ASBEST-& ERZIMPORT OSCAR H. RITTER K. G.
Hamburg :—: Ballindamm 7

ASBESTOS - ORES - MINERALS

Import Export Transit

THE STRAITS TRADING COMPANY LIMITED

P.O. Box 700, OCEAN BUILDING, SINGAPORE

Works: SINGAPORE & PENANG

STRAITS REFINED TIN

— "THE STRAITS TRADING CO. LTD." BRAND —

THE BRITISH TIN SMELTING CO. LTD., LIVERPOOL

London Agents:

W. E. MOULSDALE & CO. LTD., 2 Chantrey House, Eccleston Street, S.W.1

Above or below the ground

—WHEREVER FLAMEPROOF SWITCHGEAR IS NEEDED

Breaking Capacity 25 MVA at 400 volts.

75 MVA at 3.3 kV.

Metrovick Type SF switchgear is designed for service wherever flameproof equipment is specified, and is fully 'Buxton' certified. The equipment is available in two frame sizes to meet most normal requirements.



METROPOLITAN-VICKERS

ELECTRICAL CO. LTD. TRAFFORD PARK MANCHESTER, 17

An A.E.I. Company

LEADING SWITCHGEAR PROGRESS

F/M701